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NEW MEXICO
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Ground Water Quality Bureau

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RON CURRY
Secretary
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Deputy Secretary

September 30, 2010

Ms. LaDonna Turner
Site Assessment Manager
U. S. EPA Region 6 (6SF-TR)
Technical and Enforcement Branch
Superfund Division
1445 Ross Ave. Suite 1200
Dallas, Texas 75202

Dear LaDonna:

RE: Submittal of 8 pre-CERCLIS screening assessments for legacy uranium mines within the Grants Mining District Ambrosia Lake sub-district, McKinley County, New Mexico

The New Mexico Environment Department ("NMED") Superfund Oversight Section herein submits 8 pre-CERCLIS screening assessments ("PCSs") of legacy uranium mines within the Ambrosia Lake sub-district of the Grants Mining District (see Table 1).

All the mines included in these PCSs conducted underground operations. Only one minesite, the Dysart #2, retains current operational capability and usage: the mineshaft has an operational hoist, which is used by the current owner to access the adjacent Section 12 mine, which is being assessed for possible reactivation. Most of the other minesites assessed in these reports still have open or covered shafts, which should be evaluated for appropriate protective measures to preclude potential human or animal entrapment, as well as for overall structural stability to prevent collapse. Additionally, shafts that were completed into ore bodies below the water table—both those that are still open and those that may have been improperly backfilled—could provide conduits for contaminant entry into the ore-bearing Westward Canyon member of the Morrison Formation, which is known to be a prolific aquifer and source of water for wells in the area. Additionally, piles of presumed waste materials and possibly some stockpiled ore materials, as well as some areas with elevated levels of gamma radioactivity (in comparison to either site-specific or areal background values) should be delineated and assessed to determine whether remedial is warranted. NMED anticipates that erosional or wind dispersion of such materials may have spread contamination within the immediate vicinity away from individual minesites. Note that reconnaissance of the John Bull mine was last documented in 1995, and therefore, a visit to this site is recommended to assess current conditions. All other sites included with this submittal have been physically assessed within the last 3 years.

Table 2 presents NMED's prioritization of three of the assessed minesites for possible immediate response actions in order to mitigate physical hazards. The main shaft of the Chill Willis mine, which is identified as NMED's first priority, collapsed during the operational period due to washout from a leaking hose. Both this shaft as well as a secondary shaft, currently are denoted by deep collapse features, one of which has been reported to be increasing in size. Only one of these shafts is indicated to be surrounded by a fence. Additionally, both historical and recent description of this site indicate the existence of a powder magazine, which should be assessed for the presence of explosive or other hazardous materials. The Hogan minesite, which is identified as NMED's second priority, is visible from the main highway. The shaft has not been backfilled; the concrete cap on this shaft is visibly deteriorated to the point where at least one substantial opening has formed. The Dysart #1 minesite, which is NMED's third priority, includes a subsidence feature that was reported in a recent site reconnaissance; NMED

recommends that this be examined for stability with respect to the historical location of the main shaft and associated underground workings.

Table 3 presents NMED's prioritization of three minesites for consideration of possible emergency assessment and removal due to potential threats to human health and the environment. The unreclaimed collapsed main shaft of the Chill Willis mine, which is designated as NMED's highest priority site among these mines, may provide a conduit for contaminant distribution to ground water both from influx of remaining surface contaminants (e.g., reported on-site waste and ore materials), as well as from materials that were buried in the collapse. The Johnny M mine, which is designated as NMED's second priority site, utilized mill tailings as backfill material; although NMED assessment immediately following site reclamation here did not indicate impacts to ground water from this practice, subsequent evaluation is recommended to ensure that ground water degradation has not occurred in the interim. The Hogan mine, which here is identified as NMED's third priority site, is located near a residential well, to which NMED only recently has obtained permission to sample. Future sampling may indicate whether oxidation of remaining ore has impacted water quality in this well.

All sites should be assessed for the existence of materials with elevated radioactivity that could pose threats to human health and the environment. Additionally, the existence of regional impacts from legacy uranium sites throughout the Grants Mining District to surface and ground water systems has not been determined. Mines which accessed ore deposits below the water table (*i.e.*, "wet" mines) necessitated continual dewatering during operation. Contaminants within dewatering effluents may have sorbed to sediments, resulting in ongoing impacts to surface and ground water hydrologic systems to the present day through gradual desorption and remobilization of such contaminants. Additionally contaminant impacts from all mines, originating from leaching of remaining on-site waste and ore materials, initially could affect the surface water system, and thereafter the connected alluvial ground water system as well as underlying bedrock aquifers. These impacts, if they exist, predominantly may be localized to the immediate vicinity of the Site. Generalized investigations of potential sediment and alluvial ground water impacts from both "wet" and "dry" former uranium mines within the Grants Mining District are recommended as part of regional ground water quality characterization. Depending upon the results of these investigations, additional site-specific water characterization activities might be considered to identify the legacy uranium minesites from which contamination originates.

NMED will submit site discovery forms for these sites based on further prioritization of the sites in the Grants Mineral Belt. NMED will work closely with EPA and NM EMNRD to coordinate and support response actions at the sites. Please contact David L. Mayerson of my staff at (505) 476-3777, or me at (505) 827-2908 if you should have any questions.

Sincerely,



Dana Bahar
Manager
Superfund Oversight Section

Enclosures: 8 pre-CERCLIS screening assessments

Copies with enclosures:
Lisa Price, EPA
John Pfeil, NMENMRD
David Mayerson, NMED

Copies without enclosures:
Kathy Gibson, EPA
Janet Silva, NMED
NMED/GWQB/SOS September 2010 read file

Table 1: Summary of further action under CERCLA recommended

* "Dry" mining operations accessed ore above the water table, while "wet" operations necessitated

Mine	Surface ownership	"Dry" or "wet" mining operation*
Bucky	private (identity unknown)	dry
Chill Willis	(b) (6)	wet
Dysart #1	Southwest Resources, Inc.	dry
Dysart #2	Southwest Resources, Inc.	dry
Hogan	(b) (6)	wet
John Bull	United Nuclear Corporation	wet
Johnny M	Fernandez Company Ltd./Floyd Lee Ranch	wet(?)

dewatering because ore was accessed below the water table.

Table 2: Sites proposed for additional evaluation and possible emergency response due to potential physical hazards

Priority	Mine	Description of potential physical hazards
1	Chill Willis	<ul style="list-style-type: none"> Two shaft locations are denoted by collapse craters that are currently 50 and 70 feet deep respectively, one of which is reported to have enlarged in recent years. Probable powder magazine remaining on-site should be investigated for potential explosive or other hazardous materials.
2	Hogan	Concrete cap is visibly deteriorated with at least one opening. Although located on private property, site is visible from public roadway and is accessible to trespassers. Fence surrounding shaft appears to be neither high nor substantial enough to deter entry.
3	Dysart #1	Subsidence feature reported in recent reconnaissance should be investigated to determine if this may denote collapse of underground workings or reclaimed shaft.

Table 3: Sites proposed for additional evaluation and possible emergency response due to potential threats to human health or for release to the environment

Priority	Mine	Description of potential environmental hazards
1	Chill Willis	<ul style="list-style-type: none"> Main shaft collapsed during operation due to washout from leaking dewatering hose, and may provide conduit for contaminants to ground water. Reported occurrence of ore materials onsite could impact both surface flow quality within San Mateo Creek and ground water quality.
2	Johnny M	<ul style="list-style-type: none"> Ground water quality should be assessed for possible degradation from use of mill tailings as backfill material. Possible areas of elevated radioactivity may either remain or have been exposed by erosion after previous reclamation.
3	Hogan	<ul style="list-style-type: none"> Potential contaminant impact from exposed ore body within mine to nearby water quality in nearby residential well

Ashley II of Charleston, Inc. v. PCS Nitrogen, Dist. South Carolina, 9/30/2010

Posture: EPA determined NTC Removal warranted

PRPs: Three former owners, former operators, current owner, lessee

Site Background:

- Charleston, S.C., 43 acres, abutting a river
- Historic operations of fertilizer plant
 - Major source: Pyrite ore burned as feedstock to create sulfuric acid, the cinders of which (having not burned completely) resulted in arsenic- and lead-contaminated pyrite slag
 - Contributory source: lead sludge rinsed from the chambers which were used to make sulfuric acid
 - Note: majority of Site covered with graded limestone run of crusher to promote better drainage
- Contamination: arsenic, lead, low pH and carcinogenic polyaromatic hydrocarbon ("cPAH")
 - Note: arsenic and lead found across entire Site
 - Note: two hot spots of cPAH
 - Note: court states multiple times that costs of contamination are directly related to:
 - 1) volume of contaminated soil; and,
 - 2) the *spread* of that contaminated soil across the site due to earthmoving and other on-site developmental activities

Remediation:

- 1) Soil contaminated above high-level mg/kg arsenic or lead, will be removed and replaced with clean back fill
- 2) Soil contaminated above mid-level mg/kg arsenic or lead, will be capped
- 3) Groundwater contaminated with arsenic or lead, will be directed to sewer for treatment

Excerpt of PRP's proposed methods of apportionment, and the court's analysis (all emphasis mine):

The court finds that the contamination of the Site, which has caused the need for remediation constitutes a single harm. *See United States v. Monsanto Co.*, 858 F.2d 160, 172-73 (4th Cir.1988) (finding that environmental contamination on a piece of property requiring remediation constitutes a single harm). The remedy selected by EPA to clean up the contaminated soil and sediments at the Site involves excavation and off-site disposal. The volume of contaminated soil is directly related to how much the remediation is going to cost. The predominant factors that contribute to the volume of contaminated soil and thus drive the cost of the remediation are the volume of hazardous materials and the spread of these hazardous materials throughout the Site.

The question becomes, then, whether the harm at the Site is divisible based upon how much contamination each party contributed to the Site and how much soil each party caused to be included in the remediation by spreading the contamination throughout the Site. In an attempt to meet its burden of demonstrating divisibility, PCS presented the court with a total of five proposed methods of apportionment. In determining whether the harm at the Site is divisible, the court will address each of PCS's proposals and will consider any other possible bases for apportionment contained in the record.

Method 1

PCS's first method of apportionment is based upon the amount of fill or other material added to the Site during each ownership period. PCS's expert Grip used aerial photography to calculate the amount of material added to the Site as of certain dates and used these calculations to allocate shares of the remediation cost to Ross, PCS, and the Holcombe and Fair Parties. Grip then allocated shares of responsibility to RHCE and Allwaste based upon the size of their parcels and the amount of ROC to be removed.

The court finds that this method does not provide a reasonable basis for apportionment. PCS has not shown a reasonable relationship between the addition of material to the Site and the spread of contamination on the Site. No evidence has been presented to the court indicating that all new material identified in aerial photography was contaminated. Furthermore, the aerial photography presented to the court does not detect contamination. This

method also fails to take into account the spread of contamination already present on the Site to new areas of the Site, which is one of the main factors contributing to the cost of the remediation. A method that does not take both of the main factors that have contributed to the cost of the remediation into account does not reasonably account for the harm at the Site.

Method 2

~~PCS's second method of apportionment is based upon the volume of contaminants introduced to the Site. PCS argues that data in the record allows the court to determine the approximate amount of arsenic and lead Ross and CNC each contributed to the Site. The court finds, however, that this method of apportionment is not a reasonable basis for apportionment in this case for three reasons.~~ **First**, the record indicates that much of the remediation in this case is necessary because of the spread of the contamination throughout the Site through earthmoving and other development activities. As previously stated, an apportionment that fails to take into account the spread of contamination is not reasonable on the facts of this case. **Second**, the presence of other phosphate fertilizer plants operating in the area of the Site before Planters began operations indicates that volumetric calculations may overstate the amount of pyrite slag Planters introduced to the Site. The record shows that pyrite slag was used as fill and for road stabilization around the turn of the century, indicating that pyrite slag may have been present on the Site prior to Planters' ownership. **Third**, Grip withdrew his volumetric calculations at trial because they were inaccurate. [Trial Tr. 2118:1-13].

Method 3

PCS's third method of apportionment is based upon the period of time Planters and CNC each operated the fertilizer plant. The court finds that although this method of apportionment was part of the court's analysis in *Burlington Northern*, it is not reasonable based upon the facts in this case. **First**, apportioning the amount of contaminants based upon years of operations without data on the approximate production levels of the fertilizer plant during these years could result in an apportionment that is not reasonably accurate. While the record makes clear that Planters operated the fertilizer plant for many more years than CNC, Planters owned the plant during the Great Depression, indicating that production levels may have been low during some years. Apportioning harm based upon years of operation without data on the approximate production levels throughout the years would be unreasonable. **Second**, while this method takes into account the introduction of lead, arsenic, and acid to the Site, it fails to take into account the subsequent spread of the contamination at the Site. Because the spread of the contamination is a major factor driving the remediation, the failure to take this factor into account makes this method of apportionment unreasonable.

Method 4

PCS's fourth method of apportionment is based upon an analysis of the parties who first physically disturbed the different portions of the remediation area. Grip used aerial photography to determine which party first engaged in filling, grading, or other development activities on the Site. Grip then used this information to determine the percent of the remediation area attributable to each party.

The court finds that PCS's fourth method of apportionment also fails to provide a reasonable basis for apportionment. **First**, this method fails to take into account the original sources of the contaminants, which is one of the driving factors of the remediation. **Second**, the use of aerial photography to determine when areas of the Site were first impacted by contamination is problematic because aerial photography cannot show when contaminants were moved across the Site; it can only show when earthmoving activities took place. **Third**, analyzing areas of first impact does not take into account the *volume* of soil affected by earthmoving activities. Subsequent, more invasive, earthmoving activities in an area where earthmoving has already occurred may disturb a greater volume of soil, which would not be taken into account in this calculation. The court finds that PCS's fourth method of apportionment is not reasonable.

Method 5

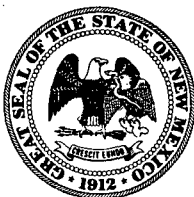
At trial, PCS argued that the court could apportion liability using Kristen Stout's ("Stout") analysis in which she identified all of the contaminated soil samples at the Site she believed were potentially impacted by CNC. The court finds that this method is not a reasonable basis for apportionment because the number of contaminated soil samples that Stout attributes to CNC is not reasonably related to the volume of contaminated soil on the Site. No evidence has been presented to the court as to why the number of soil samples taken on the Site is a reasonable proxy for the total volume of contaminated soil.

Conclusions With Regard to Divisibility

While the harm at the Site is theoretically divisible based upon: 1) how much contamination each party contributed to the Site, and 2) how much soil each party caused to be included in the remediation area by spreading the contamination throughout the Site, the court finds that the record does not provide the court with a reasonable basis for apportioning this harm.

Although PCS attempted to provide the court with a reasonable basis for determining the volume of contaminants introduced to the Site by Planters and CNC, these calculations were withdrawn at trial because they were inaccurate. However, even if the court had reasonably accurate calculations of the volume of contaminants released on the Site by Planters and CNC, this is only half of the equation; the other main factor contributing to the cost of the remediation is the spread of contamination across the Site. PCS has attempted to provide the court with a basis for determining the spread of contamination by calculating the amount of new material added to the Site by each party and by analyzing when each part of the Site was first impacted by earthmoving activities. Neither of these calculations, however, provides a reasonable estimate of the additional volume of soil contaminated by earthmoving and development activities. First, there is no way of knowing whether the new material added to the Site, which was identified through aerial photography, was contaminated. Second, looking only at areas of first impact does not take into account subsequent, more invasive impacts that increased the depth of contamination at the Site.

While the record reveals that construction and earthmoving activities occurred throughout the history of the Site, the information in the record provides the court with no reasonable basis for determining how much each party contributed to the volume of contaminated soil through such activities. Without a divisor over which to apportion the spread of contamination across the Site, the court cannot reasonably apportion the cost of remediating the Site among the parties. In addition, evidence in the record suggests that the acidic (low pH) conditions on the Site led to the migration of lead and arsenic through the soil. This consequence of commingling contaminants on the Site indicates that the volume of hazardous materials and the amount of earthmoving and construction activities on the Site do not have a direct cause/effect relationship with the amount of harm at the site. *See Monsanto Co.*, 858 F.2d at 172-73 (finding that the volume of contaminants deposited on a site was not a reasonable basis for apportionment when no evidence of the characteristics of the contaminants and how they might interact was introduced). The court finds that there is no reasonable basis for apportioning the harm at the Site and that therefore the harm at the Site is indivisible. Thus, the court will address the parties' contribution claims.



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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of Chill Willis mine
(Grants Mining District), McKinley County, New Mexico: Further
action under CERCLA recommended

Site name	Chill Willis mine	Alternative names	Chill Wills; Rialto; Section 13; Section 24
Street address	not applicable	City	not applicable
Zip code	not applicable	State	New Mexico
		County	McKinley
Latitude	35.347278	Longitude	-107.746722
		TRS	T13N, R9W, s. 24NW

Site physical description:

Information on the current physical description of the Chill Willis minesite ("Site") is summarized from the March 23, 2010 Site visit report by Intera, Inc., contractor to the New Mexico Energy, Minerals, and Natural Resources Department ("NMEMNED," Ref. 1). The Site is located approximately 1000 feet ("ft") northeast of San Mateo Creek ("SMC") within a flat valley that drains toward SMC (Ref. 1, p. 1). State highway 605 is approximately ¼ mile to the north; the Schmitt Ranch is located approximately ½ mile to the east. During the 2010 site inspection, two shafts, one pit, seven piles, three structures, one foundation, one fenceline, and miscellaneous debris were noted on-Site (Ref. 1, p. 2, 4).

One collapsed shaft was originally reported to be 375 to 450 ft deep. Currently this shaft, which is surrounded by a 3-ft tall fence, is 15 ft in diameter, and filled to a depth of approximately 50 ft. Three vertical timbers surround the shaft, and timbering is visible within the shaft in the collapse-crater (Ref. 1, p. 3, 9). The second shaft, located approximately 150 ft south of the first shaft, is denoted by a collapse feature 40 ft in diameter and 70 ft deep; the

depth has reportedly increased in recent years (Ref. 1, p. 3).

The pit is approximately 20 ft wide, 50 ft long, and 5 ft deep (Ref. 1, p. 3).

One waste pile comprises a ridge of waste material nearly 400 ft long; two other nearby piles also are comprised of waste rock. Another two piles, one of which is approximately 35 ft wide by 85 ft long by 11 ft tall, are comprised of ore rock (Ref. 1, p. 3). The highest on-Site gamma radiation reading was recorded from gray rock on one of these ore piles (1200 microroentgens/hr [$\mu\text{R/hr}$] at 0 ft, 400 $\mu\text{R/hr}$ at 4 ft, background is 26 $\mu\text{R/hr}$ at 0 ft and 24 $\mu\text{R/hr}$ at 4 ft [Ref. 1, Table 2]). Gamma radiation levels from the other of these two piles of ore rock, which is approximately 35 ft wide, 85 ft long, and 11 ft tall, were recorded to be 34 $\mu\text{R/hr}$ at 0 ft and 37 $\mu\text{R/hr}$ at 4 ft (Ref. 1, p. 3, 4, Table 2). Gamma radiation readings on other waste and ore piles range from 34 to 500 $\mu\text{R/hr}$ at ground surface, and 37 to 220 $\mu\text{R/hr}$ at 4 ft elevation (Ref. 1, p. 4).

One of the structures, which is identified in Ref. 2 (p. 227) as a powder magazine, now is partially buried by sand; a 'No Smoking' sign is still visible on this structure (Ref. 1, p. 3).

Site identification:

The Site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

Mining occurred from the basal arkosic Poison Canyon sandstone within the Brushy Basin Member of the Morrison Formation (Ref. 1, p. 2). The mine was operated between 1960 and 1963 first by Bailey and Fife, and later by Farris Mines; Febco Mines, Inc. may have operated or controlled the Site during some of the period of operation (Ref. 3, p. 3). In 1963, the main shaft caved-in due to a leak in a dewatering hose, which caused major washout from the shaft and eventual failure of shaft timbers. The headframe and most of the mining equipment were lost in the cave-in (Ref. 2, p. 224).

The mine produced 9,261 tons of ore, which yielded 31,381 pounds of uranium oxide at an average grade of 0.17% (Ref. 3, p. 3). Febco Mines, Inc. also accessed ore underlying section 13 through the Chill Willis shaft (Ref. 3, p. 2). In 2010, no reclamation, other than the fence surrounding one shaft, was noted (Ref. 1, p. 4).

Targets:

Surface runoff from the Site either directly enters SMC, or else becomes alluvial ground water, which also flows towards SMC (Ref. 1, p. 2); however no erosion was observed at the Site (Ref. 1, p. 5). Due to its proximity to State highway 605 (Ref. 1, p. 4), the Site may be accessible to trespassers. In addition to the proximity to the Schmitt Ranch, two other residences are located within a one-mile radius. The Site is located within a pasture that is used for grazing of cattle and horses (Ref. 1, p. 4).

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 4).

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the Chill Willis mine (Grants Mining District), McKinley County, New Mexico.

August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0.5 – 1.0	B 01104	(b) (6)	DOM	04/02/1986	303	247	4.0	12.0
1.0 – 2.0	B 00390	FERNANDEZ CO. LTD	IRR	12/31/1974	1800	900	6.63	850.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/10/1977	95	72	5.0	2.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/11/1977	90	73	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/12/1977	80	74	5.0	1.0
	B 00456	(b) (6)	STK		0	0		
	B 00997		MUL		0	0		
	B 01115		DOM	07/21/1986	478	204	4.0	30.0
	B 01190		STK	08/31/1989	390	37		15.0
	B 01544		DOM	06/14/2003	715	624	5.0	6.0
	B 01636		DOM	05/10/2005	260	80	4.0	5.0
2.0 – 3.0	B 00558	N.M. STATE HWY DEPT.	PUB		0	0		
	B 00659	(b) (6)	DOM	01/18/1979	220	190		15.0
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN	05/14/1981	1611	1315	4.5	
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00851	KERR-MCGEE NUCLEAR CORP	DEW		0	0		
	B 00861	(b) (6)	DOM		0	0		
	B 01084	FERNANDEZ COMPANY	STK	01/01/1963	320	60		
3.0 – 4.0	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	20.0
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	10.0
	B 00557	NEW MEXICO STATE HWY DEPT	PUB		0	0		
	B 01086	FERNANDEZ COMPANY	STK	01/01/1947	210	20		
DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD								
DEW -- DEWATERING WELL								
IRR -- IRRIGATION								
MIN -- MINING OR MILLING OR OIL								
MON -- MONITORING WELL								
MUL -- 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS								
PUB -- 72-12-1 CONSTRUCTION OF PUBLIC WORKS								
STK -- 72-12-1 LIVESTOCK WATERING								

Site ownership and Potential Responsible Parties:

The original operator, Bailey and Fife, was succeeded by Farris Mines, which operated the mine at the time of the 1963 cave-in (Ref. 2, p. 224); Febco Mines, Inc. operated or controlled the Site throughout some of the period of operation (Ref. 3, p. 3). Ref. 2 (p. 224) reports that Conoco Minerals Division had control of the mining interests by 1980. Surface rights are owned by Margaret Marquez and Theodore and Doris Schmitt (Ref. 5).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

The most recent site reconnaissance was conducted by Intera Inc. on March 23, 2010 (Ref. 1, p. 1).

Recommendation:

Potential surface hazards, such as the powder magazine and the shafts, should be assessed and mitigated as soon as possible.

Additional investigation of the Site under CERCLA authority is recommended to assess the areal extent of elevated radioactivity readings noted in the most recent Site reconnaissance to determine if threats to human health and the environment exist. NMED also recommends assessment of sediments in the Site vicinity in order to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water had to be pumped from the Chill Willis mine in order to access the ore deposits, but the location of the effluent discharge is not known. A linear feature trending from the primary caved-in shaft toward SMC is visible in aerial photograph (Ref. 1, figure 4a), which may mark the former route of a ditch or pipeline, which carried this effluent. This linear feature, as well as the bank of SMC, should be surveyed to attempt to determine where the effluent discharge may have been routed; radiological surveying and sediment sampling to depth also is recommended to determine potential impacts to sediments. A generalized investigation of potential alluvial ground water impacts from "wet" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-Site installation of one or more monitor wells then should be considered.

Data from other former "wet" mines suggest that repressurization of the ore-host Morrison Formation, following cessation of pumping for mine dewatering, may be causing mobilization of uranium and associated minerals, and consequent degradation of ground water quality, due to influx of oxygenated ground water. The potential for such impacts, on both regional and site-specific scales, should also be assessed and characterized.

Ms. LaDonna Turner, EPA R6 SAM

Pre-CERCLIS screening assessment of the Chill Willis mine (Grants Mining District), McKinley County,
New Mexico.

August 16, 2010

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1. Intera Inc., April 20, 2010. "Abandoned uranium mine assessment for the Chill Willis site (NM0101)." Prepared for the New Mexico Energy, Minerals and Natural Resources Department.
 2. Anderson, Orin J., 1980(?). "Abandoned or inactive uranium mines in New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 148.
 3. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
 4. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
 5. New Mexico Energy, Minerals and Natural Resources Department, August 16, 2010. "RE: section 32 mine-MARP Prior Rec files." Emailed edits from Susan Lucas-Kamat (NMEMNRD) to David L. Mayerson (NMED).



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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS screening assessment of the Dysart #1 mine
(Grants Mining District), McKinley County, New Mexico:
Further action under CERCLA is recommended

Site name	Dysart #1	Alternative names	Rio de Oro, Section 11
Street address	not applicable	City	not applicable
State	New Mexico	Zip code	not applicable
County	McKinley	Latitude	35.45525
Longitude	-107.872056	TRS	14N, 10W, s. 1SW

Site physical description:

Information on the current physical description of the Dysart #1 minesite ("Site") is summarized from the April 10, 2010 Site visit report by Intera, Inc., contractor to the New Mexico Energy, Mineral, and Natural Resources Department (NMEMNED; Ref. 1).

Surficial Site reclamation occurred after 1980 (Ref. 1, p. 3) Current Site features include a possible subsidence feature, four waste piles, one open cut, one foundation, and power lines. The waste piles are soil-capped and may be comprised of soil, with some rock and associated uranium minerals.

Site identification:

The Site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

The Dysart #1 mine operated between 1956 and 1962 (Ref. 2) or 1961 when the orebody had been mined-out (Ref. 3, p. 60) producing nearly 892,000 tons of ore from the Westwater Canyon member of the Morrison Formation with an average grade of 0.21% uranium oxide (U_3O_8), and over 47,000 pounds of vanadium oxide (V_2O_5 ; Ref. 4). Mining occurred underground through a 395 ft shaft (Ref. 5). All workings were completely dry. The mostly black uranium mineralization was accompanied by minor occurrences of molybdenum minerals on the fringes of the ore, and of native selenium, which mostly was found in the southeastern area of the mine (Ref. 3, p. 60).

In the recent Site reconnaissance, the highest gamma radiation reading on one waste pile was 350 microRoentgens per hour ($\mu R/hr$) at 0 feet (ft) above ground surface ("ags;" Ref. 1, p. 2-3). The highest overall Site gamma radiation reading was 450 $\mu R/hr$ at 0 ft ags (Ref. 1, p. 4). Site background gamma radiation level was determined to be 24 $\mu R/hr$ at both 0 and 4 ft ags (Ref. 1, p. 3).

Targets:

Site surface runoff drains to Martin Draw, which is within about 1000 ft of the Site and joins the Arroyo del Puerto nearby (Ref. 1, p. 2). Hoof prints on the Site suggest the presence of grazing cattle (Ref. 1, p. 4).

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 6).

Site ownership and Potential Responsible Parties:

Ref. 1 (p. 3) indicates that George Lotspeich currently owns the minesite; Mr. Lotspeich is President of Southwest Resources, Inc. (Ref. 7, p. 2, 3).

Peabody and Fraka constructed the mineshaft in 1955. Rio de Oro operated the mine between 1956 and 1960 and Mid-Continent Exploration Company operated between 1961 and 1962 (Ref. 5). Alternatively Rio de Oro and Mid-Continent Exploration Company may have jointly operated the mine between 1959 and 1961; Homestake-Sapin Partners operated between 1961 and 1962 (Ref. 4; Ref. 5). United Nuclear-Homestake Partners owned the mine in 1980, but did not conduct any mining (Ref. 5).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

The most recent Site reconnaissance was performed by NMEMNRD contractor Intera Inc. on April 10, 2010.

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the Dysart #1 mine (Grants Mining District), McKinley County, New Mexico.
 August 16, 2010

Distance from Site (miles)	OSE record number	Owner's first name	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
1.0 -2.0	B 00362		RIO ALGOM MINING LLC	MIN	11/30/1956	3093	0	10.75	475.0
	B 00363		RIO ALGOM MINING LLC	MIN	04/30/1956	745	0	4.5	20.0
	B 00372		SABRE-PINON CORPORATION	MIN	09/12/1956	796	0	8.63	75.0
	B 00373		RIO ALGOM MINING LLC	MIN	12/31/1956	1003	0	13.38	90.0
	B 00994		RIO ALGOM MINING LLC	MIN	01/02/1958	827	0		
2.0 -3.0	B 00143	(b) (6)		DOM	07/18/1960	90	60		
	B 00366		RIO ALGOM MINING LLC	MIN	12/31/1955	760	0	4.5	10.0
	B 00371		SABRE-PINON CORPORATION	MIN	08/25/1956	752	0	8.63	100.0
	B 00994		RIO ALGOM MINING LLC	MIN	09/18/1958	857	0		
	B 01087	(b) (6)	BROTHERS	STK	05/25/1985	651	566	5.0	6.0
	B 01246	(b) (6)		STK	04/29/1992	1200	700	6.63	100.0
3.0 -4.0	B 00522		UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0		
	B 00522		UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0	5.0	0.0
	B 01558	(b) (6)		STK	03/19/2004	800	660	5.0	10.0

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD

MIN -- MINING OR MILLING OR OIL

MON -- MONITORING WELL

STK -- 72-12-1 LIVESTOCK WATERING

Recommendation:

Additional investigation of the Site under CERCLA authority is recommended to assess any physical hazards as well as the areal extent of elevated radioactivity readings noted in the most recent Site reconnaissance to determine if threats to human health and the environment exist. NMED also recommends assessment of sediments in surface water drainages originating or crossing this Site to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "dry" mines such as this Site initially would impact the alluvial ground water system through leaching of on-site waste materials and ore stockpiles. Such impacts, if they exist, predominantly may be localized to alluvial ground water in the vicinity of the Site from leaching prior to Site reclamation. Alternatively ground water impacts may be more widespread, contributing to the overall potential degradation of the alluvial ground water regionally, as well as potentially to impacts to ground water in underlying bedrock aquifers. A generalized investigation of potential alluvial ground water impacts from "dry" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. Depending upon the results of this investigation, additional site-specific alluvial ground water characterization might be considered.

-
1. Intera Inc., May 28, 2010. "Abandoned uranium mine assessment for the Dysart No. 1 site (NM0041)." Prepared for the New Mexico Energy, Minerals and Natural Resources Department.
 2. Lucas Kamat, Susan (NMEMNRD), February 3, 2010. "Request for information." Email to David L. Mayerson, NMED.
 3. Cronk, R.J., 1963. "Geology of the Dysart No. 1 mine, Ambrosia Lake area." Included within "Geology and technology of the Grants uranium region," New Mexico Bureau of Mines and Mineral Resources Memoir 15.
 4. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
 5. New Mexico Energy, Mineral and Natural Resources Department, undated. "2007-07-20 to NMED-GWQ-Sfund.xls." Spreadsheet excerpt.
 6. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
 7. New Mexico Energy, Mineral and Natural Resources Department, date illegible. "Subpart 3: Minimal impact exploration permit application." Submitted for Section 11 mine.



BILL RICHARDSON
Governor
DIANE DENISH
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

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1190 St. Francis Drive, P.O. Box 5469
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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 17, 2010

Subject: Pre-CERCLIS screening assessment of the Dysart #2 mine
(Grants Mining District), McKinley County, New Mexico:
Further action under CERCLA recommended

Site name Dysart #2 **Alternative names** Section 11 mine, Section 11 SE shaft
Street address not applicable **City** not applicable **State** New Mexico
Zip code not applicable **County** McKinley
Latitude 35.454 **Longitude** -107.859 **TRS** 14N, 10W, s. 11 SE, 12 SW

Site physical description:

The Dysart #2 minesite ("Site") currently comprises an approximately 700-foot deep mineshaft with headframe and operational hoist (see P1). The mineshaft is reported in literature to have been 450 (Ref. 1), 490 or 550 feet (ft) deep (Ref. 2). Near to the mine shaft is a collapse crater, which marks the location of a ventilation shaft (see P2). Another ventilation shaft structure is visible at some distance from the location of the main shaft (see P3). In a 1980 inspection, two ventilation shafts existed, which were located 100 ft west and 800 ft north of the headframe respectively (Ref. 1). Additionally, an unused substation is near to the main shaft, which currently is outfitted with a generator that is used to run the hoist. A 1980 inspection (Ref. 1) describes sprawling mine dumps comprising clusters of conical piles and elongate ridges that extended for over 500 ft; however no piles were noted in the most recent Site reconnaissance.

Martin Draw is located approximately 200 ft east of the Site, and Ambrosia Lake is located approximately 1200 ft east of the Site.

Site identification:

The site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

Underground mining from the ore deposit accessed through the Dysart #2 mine occurred between 1959 and 1962, during which over 894,000 pounds of U_3O_8 was produced from the Westwater Canyon member of the Morrison Formation at an average grade of 0.18% (Ref. 3). The mine was dry during operation (Ref. 4). In 1980, scintillometer readings of 1500 cps (20 times background) were recorded along a prominent 200 ft long waste dump ridge at the intersection with the access road. Another compact dump area immediately northeast of the ridge, which was 3 to 5 ft high and 250 ft long, had a maximum scintillometer reading of 1100 cps; this site was then partially revegetated, and cattle were noted to be grazing in the area (Ref. 1).

The mineshaft and hoist currently is used to access the Section 12 mine, which is located approximately 0.4 miles to the east. In 1980, the shaft had been leased from Homestake-Sapin Partners for use as a ventilation and escape-way for this mine (Ref. 1). To date, the Site has not yet been fully reclaimed (Ref. 5). The minesite currently is involved with permitting through the Mining Act Reclamation Program (Ref. 6).

Targets:

The Site is located in close proximity to both the ephemeral Martin Draw and Ambrosia Lake, which had water at the time of the Site reconnaissance. Ground water is reportedly encountered at a depth of 550 ft (Ref. 4, p. 8). Well records from the New Mexico Office of the State Engineer that are located within a four-mile radius of the Site are shown in the table following (Ref. 7).

Site ownership and Potential Responsible Parties:

Southwest Resources Inc. currently owns the surface and mineral rights to the Site; Mr. Lotspeich is president of Southwest Resources, Inc. (Ref. 4, p. 5, 10). Ownership of the property was quitclaimed to Southwest Resources, Inc. either in 1973 by Hydro Nuclear Corporation (Ref. 8, p. 14) or in 1994 by Cobb Resources Corporation (Ref. 8, p. 13).

Rio de Oro operated the mine between 1959 and 1961; Mid-Continent Uranium Corporation also operated in 1959. Between 1961 and 1962, the Dysart #2 was operated by Homestake-Sapin Partners (Ref. 3, Ref. 2). Alternatively, Sabre-Pinon Corporation may have operated the mine between 1959 and 1963. As of 1980, the last registration with the State Mine Inspector's office was dated September 1961 (Ref. 1). United Nuclear-Homestake Partners owned the mine by 1980, but did not conduct active mining. Between 1980 and 1983, Cobb Resources Corporation (or Cobb Nuclear Corporation) used the shaft for ventilation of the Section 12 mine (Ref. 1, Ref. 2). Southwest Resources Inc. submitted a permit for exploration at the Site (Ref. 4), which was subsequently withdrawn by late 2007 (Ref. 8).

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the Dysart #2 mine (Grants Mining District) McKinley County, New Mexico.
 August 17, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
1.0 – 2.0	B 00366	RIO ALGOM MINING LLC	MIN	12/31/1955	760	0	4.5	10.0
	B 00372	SABRE-PINON CORPORATION	MIN	09/12/1956	796	0	8.63	75.0
	B 00373	RIO ALGOM MINING LLC	MIN	12/31/1956	1003	0	13.38	90.0
	B 00994	RIO ALGOM MINING LLC	MIN	01/02/1958	827	0		
2.0 – 3.0	B 00143	(b) (6)	DOM	07/18/1960	90	60		
	B 00362	RIO ALGOM MINING LLC	MIN	11/30/1956	3093	0	10.75	475.0
	B 00363	RIO ALGOM MINING LLC	MIN	04/30/1956	745	0	4.5	20.0
	B 00371	SABRE-PINON CORPORATION	MIN	08/25/1956	752	0	8.63	100.0
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0		
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0	5.0	0.0
	B 00994	RIO ALGOM MINING LLC	MIN	09/18/1958	857	0		
3.0 – 4.0	B 01087	(b) (6) BROTHERS	STK	05/25/1985	651	566	5.0	6.0
	B 01246	(b) (6)	STK	04/29/1992	1200	700	6.63	100.0

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD
 MIN -- MINING OR MILLING OR OIL
 MON -- MONITORING WELL
 STK -- 72-12-1 LIVESTOCK WATERING

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Dysart #2 mine (Grants Mining District) McKinley County,
New Mexico.
August 17, 2010

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

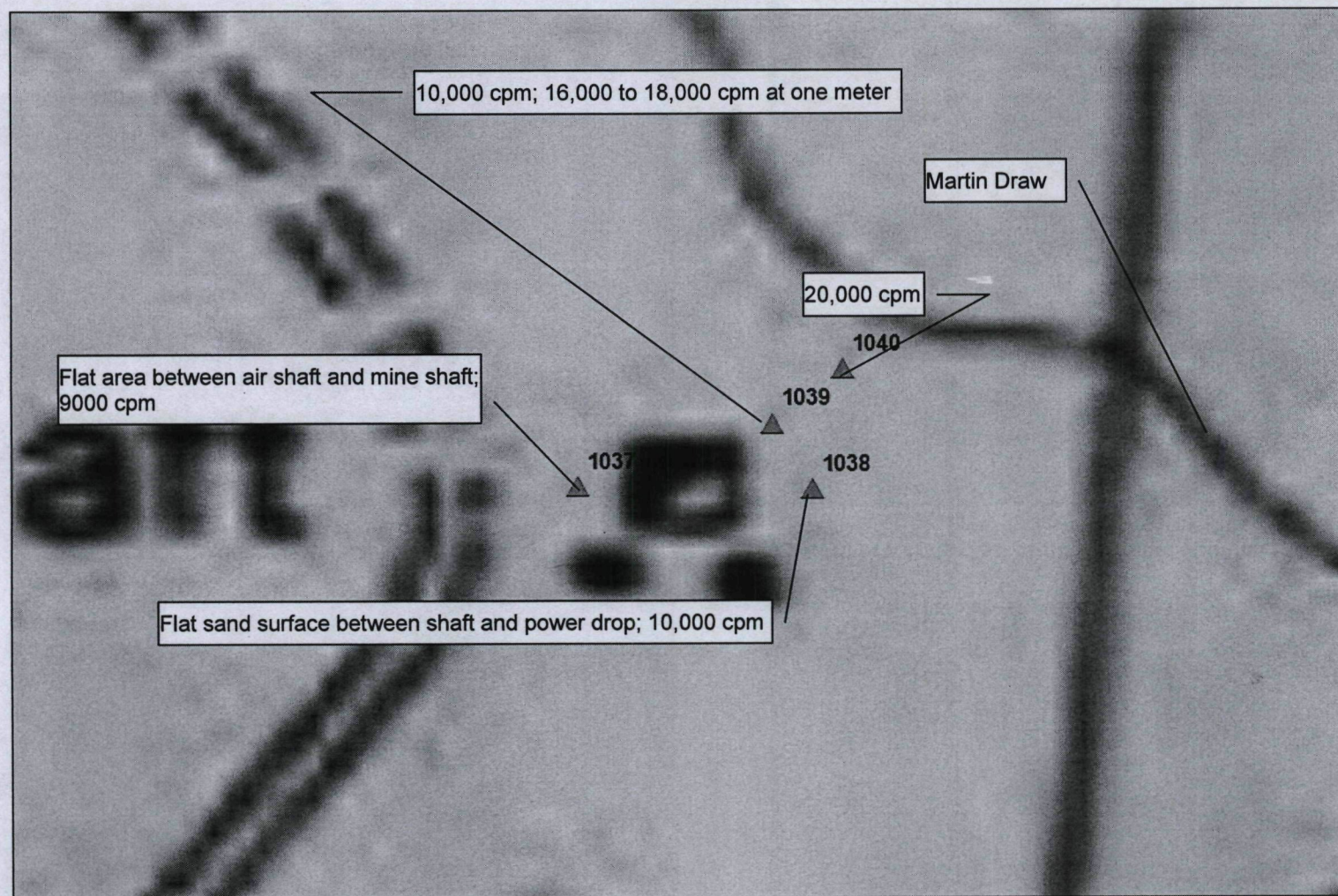
Personnel from NMED and New Mexico Energy, Minerals, and Natural Resources visited the Site on July 29, 2010 in the company of Mr. George Lotspeich (president of Southwest Resources, Inc.) and personnel from Neutron Energy, Inc. All gamma readings shown on the figure accompanying this report were made with a Ludlum 14-C analog scintillometer (serial number 194209) with an uncollimated Ludlum 44-2 gamma detector (serial number PR241278), for which readings are recorded in counts per minute ("cpm"). Contact readings from this instrument ranged from 9000 to 20,000 cpm.

Recommendation:

Site reconnaissance and characterization under CERCLA is recommended to determine the existence and extent of elevated radiological readings to assess threats to human health and the environment; background gamma radiation at other sites that have been assessed in the area generally ranges between 2000 and 5000 cpm. Additionally, the Site reconnaissance should assess physical features, such as debris, other unmarked shafts, or exploration drillholes that may pose safety hazards to human trespassers or livestock. Investigation of sediments in Martin Draw in the vicinity of erosional features originating or crossing this Site also is recommended to assess the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "dry" mines such as this Site initially would impact the alluvial ground water system through leaching of on-site waste materials and ore stockpiles. Such impacts, if they exist, predominantly may be localized to alluvial ground water in the vicinity of the Site. Alternatively ground water impacts may be more widespread, contributing to the overall potential degradation of the alluvial ground water regionally, as well as potentially to impacts to ground water in underlying bedrock aquifers. A generalized investigation of "dry" former uranium mines within the Grants Mining District is recommended as part of the characterization of ground water quality in the Grants Mining District.

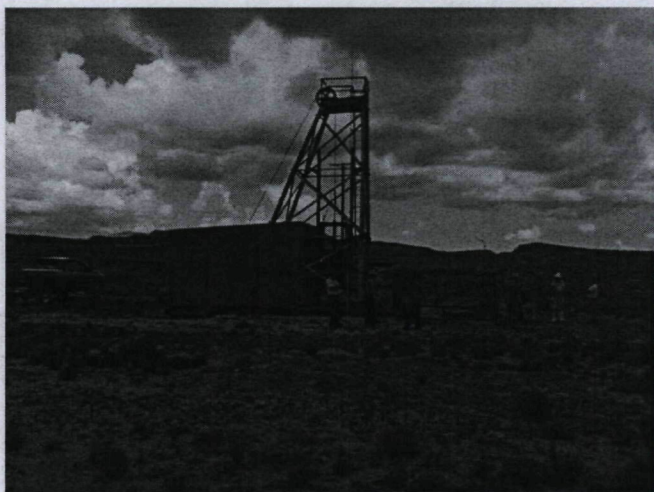
Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Dysart #2 mine (Grants Mining District) McKinley County, New Mexico.
August 17, 2010



0 100 200 400 Feet

Observation from 7/29/2010 reconnaissance of Dysart #2 minesite
(all gamma readings represent surface contact unless otherwise noted)

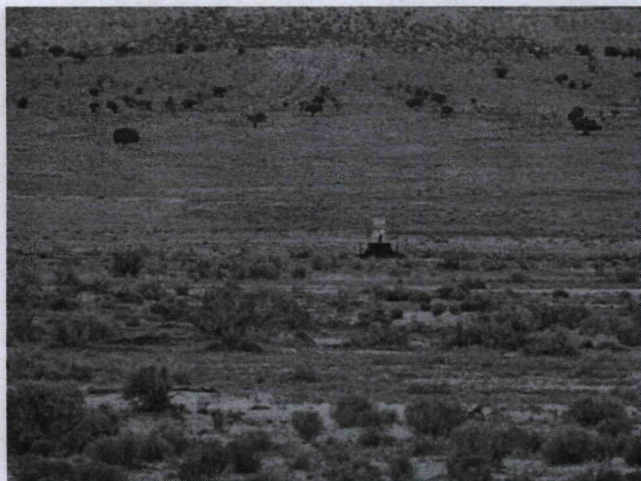
Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Dysart #2 mine (Grants Mining District), McKinley County, New Mexico.
August 17, 2010



P1: Operational hoist over mineshaft



P2: Collapse crater marking location of ventilation shaft



P3: A ventilation shaft distant from main shaft

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Dysart #2 mine (Grants Mining District) McKinley County,
New Mexico.
August 17, 2010

-
1. Anderson, Orin J., undated (reporting investigations between August 1979 and May 1980) "Abandoned or inactive uranium mines in New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 148.
 2. New Mexico Energy, Minerals, and Natural Resources Department, undated. "2007-07-20 to NMED-GWQ-Sfund.xls." Spreadsheet excerpt.
 3. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
 4. New Mexico Energy, Mineral and Natural Resources Department, date illegible. "Subpart 3: Minimal impact exploration permit application." Submitted for Section 11 mine.
 5. Ennis, David (New Mexico Energy, Minerals, and Natural Resources Department), June 16, 2010. "RE: Request for information on the Dysart #2 mine." Email to David L. Mayerson, NMED.
 6. Pfeil, John (New Mexico Energy, Minerals, and Natural Resources Department), July 20, 2010. "RE: Request for update." Email to David L. Mayerson (New Mexico Environment Department).
 7. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
 8. New Mexico Energy, Minerals, and Natural Resources Department, November 20, 2007. "RE: Exploration application, Section 11 Mine MK021EM." Letter to George Lotspeich, Southwest Resources, Inc..



BILL RICHARDSON
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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of the Hogan mine
(Grants Mining District), McKinley County, New Mexico: Further
action under CERCLA recommended

Site name	Hogan mine	Alternative names	Lucky Dooley, Fence, Plain, Section 14
Street address	not applicable	City	not applicable
State	New Mexico	County	McKinley
Zip code	not applicable	TRS	T13N, R9W, s. 14SE
Latitude	35.352386	Longitude	-107.758699

Site physical description:

The Hogan minesite ("Site") is located approximately 200 feet ("ft") north of State highway 605, approximately 1.5 miles east of Ambrosia Lake junction (Ref. 1, p. 69). A 2007 survey performed by a contractor to the New Mexico Energy, Minerals, and Natural Resources Department ("NMEMNRD") identified an open shaft, several areas of concrete (see P3) and 2 supports for the headframe.

A reconnaissance performed by personnel from the New Mexico Environment Department ("NMED") and NMENNRD on July 26, 2010 identified the same features. The shaft is fenced and covered by crumbling concrete that has been poured over railroad track sections placed over the opening (see P1). Numerous small piles of waste or bulldozed materials are scattered around the Site. Additionally, several sections of rusted iron pipe were observed close to the shaft location (see P2).

The residence and associated well of the property owner, (b) (6), is located

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Hogan mine (Grants Mining District), McKinley County, New Mexico
August 16, 2010

approximately 1000 feet ("ft") north of the Site.

Site identification:

The Site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

The mine was developed in the Poison Canyon sandstone through a 340 ft deep vertical shaft. The ore deposit, while not large, is one of the higher grade deposits in the area (Ref. 1, p. 69). Dewatering was required for production (Ref. 2). During operation, 378,510 pounds of uranium oxide was produced from 129,551 tons of ore, at an average grade of 0.26% (Ref. 3). A reinforced 10 to 15 ft thick concrete slab was placed over the shaft, which was not backfilled in anticipation of possible future development (Ref. 1, p. 69).

During the 2007 survey, waste rock radioactivity was measured to be 5000 counts per minute ("cpm") both on contact and at an elevation of 1 meter. Another reading taken approximately 200 ft to the northwest recorded 5100 cpm on contact, and 2400 cpm at an elevation of 1 meter. Radioactivity at the shaft was measured at 5000 cpm at contact, and 15,000 cpm at one meter elevation. No background readings were identified in this survey (Ref. 4).

Targets:

Potential impacts to the alluvial ground water system during Site operation may have occurred from ground water discharges from mine workings to settling ponds and ultimately to the San Mateo Creek drainage. Some portion of discharged contaminants may adhere to sediments, and propagate episodically downgradient in response to streamflows within the San Mateo Creek drainage. Current details of alluvial ground water flow are unknown, but are thought to follow general topographic slope (i.e., locally southward from the Site, and generally westward in the direction of surface water flow). Such alluvial ground water impacts may also propagate into underlying bedrock aquifers through stratigraphic, structural, and/or anthropogenic (e.g., leaky wells, mine shafts) interconnections. Additional contaminant mobilization in ore-bearing Westwater Canyon Formation could result from oxygenated ground water influx resulting from progressive basin recharge following cessation of mining activities.

Additional Site-originated impacts may have occurred from wastes remaining on-site. A residential well, which belongs to the property surface owner, Robert Sandoval, is located approximately 1000 ft to the south. This well was installed in 1978 to a depth of 383 ft (Ref. 5). The location of this well appears to be coincident with that recorded for well B-0456 that is discussed below.

Well records from the New Mexico Office of the State Engineer that are located within a four-mile radius of the Site are shown in the table following (Ref. 6). The Site is located within 2900 ft of San Mateo Creek.

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the Hogan mine (Grants Mining District), McKinley County, New Mexico

August 16, 2010

Distance from Site (miles)	OSE record number	Owner's first name	Owner's last name	use	finish date	depth well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0 – 0.25	B 01104	(b) (6)		DOM	04/02/1986	303	247	4.0	12.0
0.25 – 0.50	B 00456	(b) (6)		STK		0	0		
0.5 – 1.0	B 00415		NEW MEXICO E.I.A.	DOM	08/10/1977	95	72	5.0	2.0
	B 00415		NEW MEXICO E.I.A.	DOM	08/11/1977	90	73	5.0	10.0
	B 00415		NEW MEXICO E.I.A.	DOM	08/12/1977	80	74	5.0	1.0
1.0 – 2.0	B 00659	(b) (6)		DOM	01/18/1979	220	190		15.0
	B 00861			DOM		0	0		
	B 01115			DOM	07/21/1986	478	204	4.0	30.0
	B 01190			STK	08/31/1989	390	37		15.0
	B 01544			DOM	06/14/2003	715	624	5.0	6.0
	B 01636			DOM	05/10/2005	260	80	4.0	5.0
2.0 – 3.0	B 00390		FERNANDEZ CO. LTD	IRR	12/31/1974	1800	900	6.63	850.0
	B 00558		N.M. STATE HWY DEPT.	PUB		0	0		
	B 00997	(b) (6)		MUL		0	0		
3.0 – 4.0	B 00414		RESERVE OIL & MINERALS CORP	SAN		0	0		
	B 00415		NEW MEXICO E.I.A.	DOM	08/30/1977	59	30		
	B 00415		NEW MEXICO E.I.A.	DOM	08/30/1977	59	30	5.0	4.0
	B 00415		NEW MEXICO E.I.A.	DOM	08/30/1977	72	30	5.0	12.0
	B 00415		NEW MEXICO E.I.A.	DOM	08/30/1977	54	30	5.0	5.0
	B 00415		NEW MEXICO E.I.A.	DOM	08/30/1977	57	32	5.0	8.0
	B 00848		KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00848		KERR-MCGEE NUCLEAR CORP.	MIN	05/14/1981	1611	1315	4.5	
	B 00848		KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00851		KERR-MCGEE NUCLEAR CORP	DEW		0	0		
	B 01084		FERNANDEZ COMPANY	STK	01/01/1963	320	60		
DOM – 72-12-1 DOMESTIC ONE HOUSEHOLD									
DEW – DEWATERING WELL									
IRR – IRRIGATION									
MIN – MINING OR MILLING OR OIL									
MUL – 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS									
PUB – 72-12-1 CONSTRUCTION OF PUBLIC WORKS									
SAN – 72-12-1 SANITARY IN CONJUNCTION WITH A COMMERCIAL USE									
STK – 72-12-1 LIVESTOCK WATERING									

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Hogan mine (Grants Mining District), McKinley County, New Mexico
August 16, 2010

Site ownership and Potential Responsible Parties:

The mine was operated by Four Corners Exploration, Inc. between 1959 and 1962; United Western had a small interest in the latter stage of this production. As of 1980, United Nuclear Corporation had assumed the mining claims in this section (Ref. 1, p. 69). (b) (6) currently owns the surface rights to the Site, while the U.S. Bureau of Land Management owns the mineral rights (Ref. 7).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

Personnel from NMED and NMEMNRD performed a Site reconnaissance on July 26, 2010. All gamma readings shown on the figures accompanying this report were made with a Ludlum 14-C analog scintillometer (serial number 194209) with an uncollimated Ludlum 44-2 gamma detector (serial number PR241278), for which readings are recorded in counts per minute ("cpm"). Contact readings from this instrument ranged from 3000 cpm at locations some distance from the Site shaft to 200,000 cpm on soils near the shaft. The ground surface at the Site was very wet from heavy rainfall that had occurred during days prior to the Site reconnaissance, and additional rain occurred sporadically throughout the day of the Site visit. According to a representative from Ludlum, such environmental conditions could cause readings from the instrument to be higher than would otherwise occur under dry conditions. Additional elevation of readings also may occur due to radioactivity "shine" caused by topographic conditions or nearby radioactive sources.

Recommendation:

The Site should be assessed for potential physical hazards, especially the compromised cover of the open shaft, should be assessed and mitigated as soon as possible.

Additional investigation of the Site under CERCLA authority is recommended to assess the areal extent of elevated radioactivity readings noted in the Site reconnaissance to determine if threats to human health and the environment exist. NMED also recommends assessment of sediments in the Site vicinity in order to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

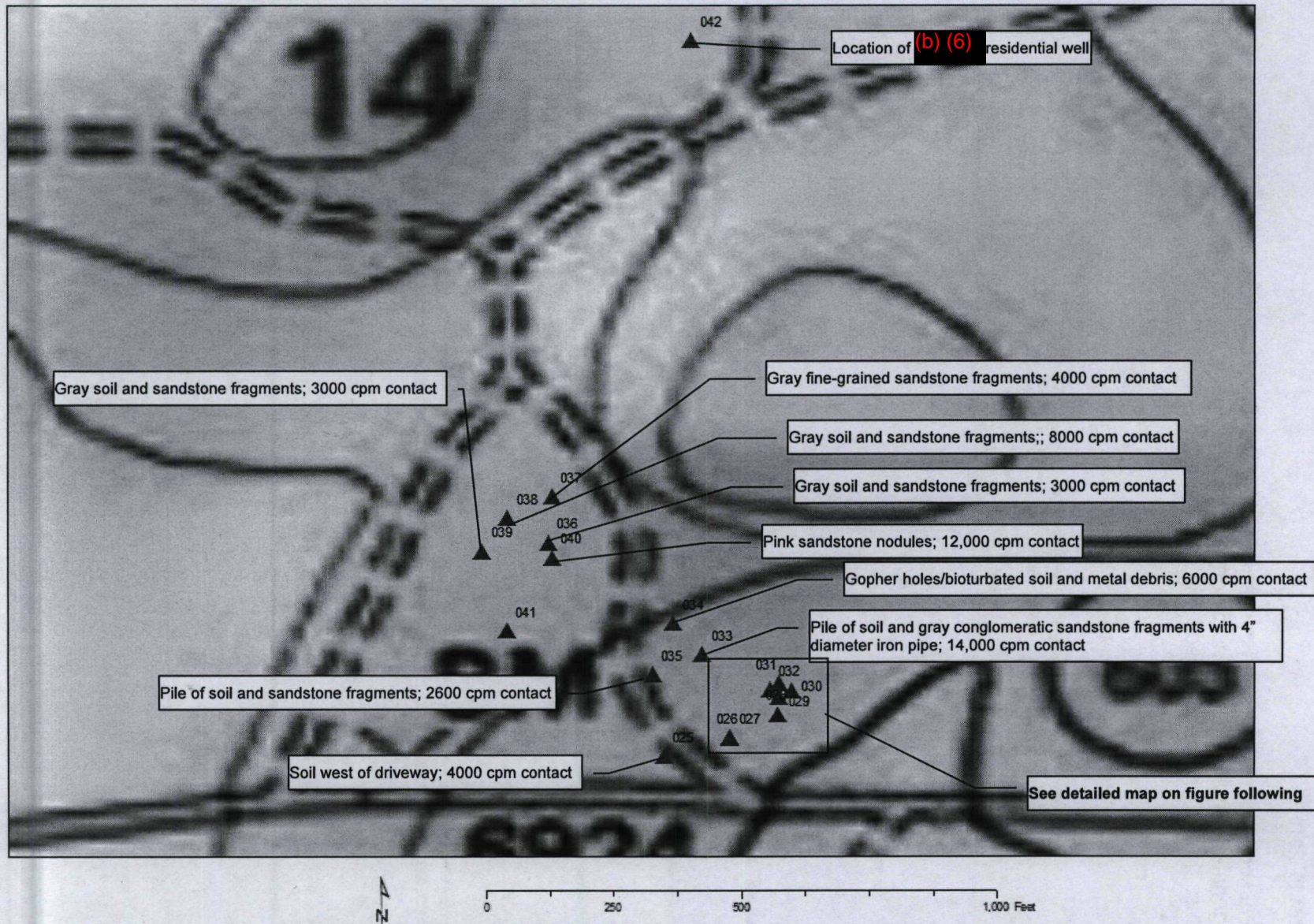
Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water had to be pumped from the Hogan mine in order to access the ore deposits, but the location of the effluent discharge is not evident. The bank of SMC near the Site should be surveyed to attempt to determine where the effluent discharge may have been routed; radiological surveying and sediment sampling to depth also is recommended to determine potential impacts to sediments. A generalized investigation of potential alluvial ground water impacts from "wet" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-Site installation of one or more monitor wells then should be considered.

Data from other former "wet" mines suggest that repressurization of the ore-host rock, following cessation of pumping for mine dewatering, may be causing mobilization of uranium

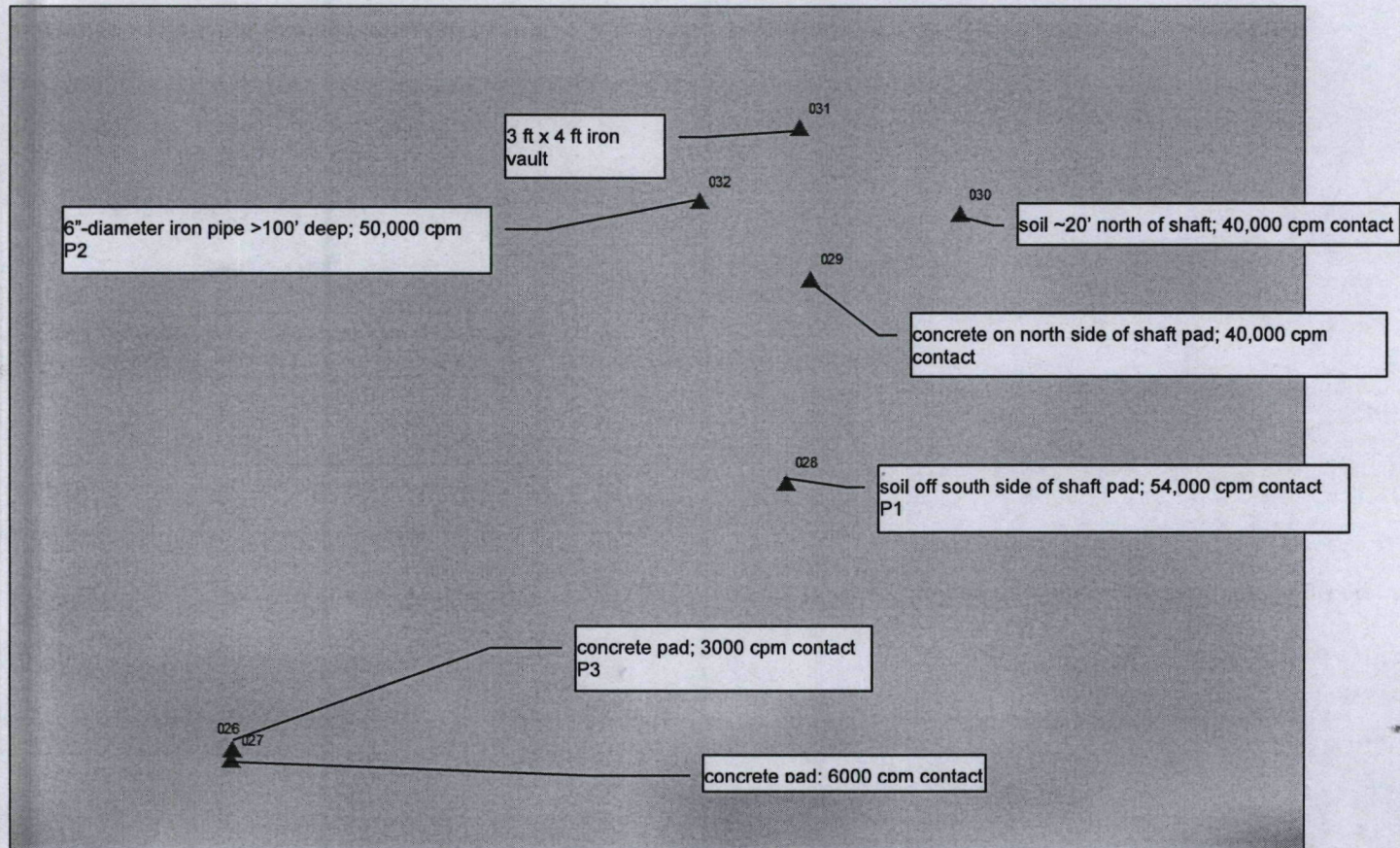
Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Hogan mine (Grants Mining District), McKinley County, New
Mexico
August 16, 2010

and associated minerals, and consequent degradation of ground water quality, due to influx of oxygenated ground water. The potential for such impacts, on both regional and site-specific scales, should also be assessed and characterized.

DRAFT



Observations from 07/26/2010 Site reconnaissance of Hogan minesite



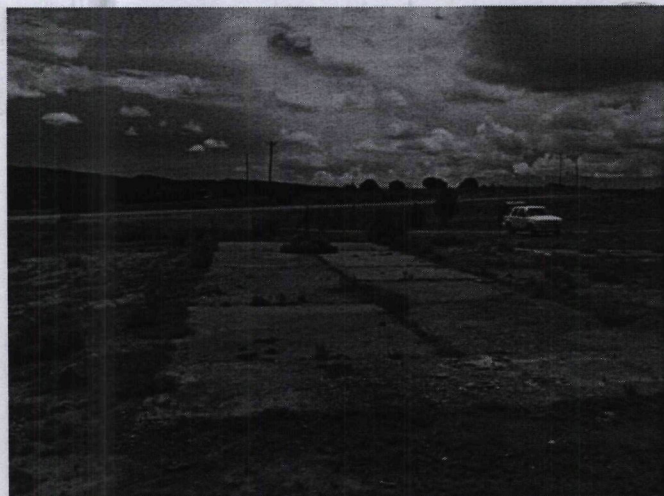
Detail of Hogan minesite shaft area



P1: Hogan mine shaft



P2: Rusty pipes near shaft; vertical pipe is greater than 100 ft deep



P3: Concrete pad adjacent to shaft

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the Hogan mine (Grants Mining District), McKinley County, New Mexico

August 16, 2010

-
1. Anderson, Orin J., 1980(?). "Abandoned or inactive uranium mines in New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 148.
 2. New Mexico Energy, Minerals, and Natural Resources Department, January 2009. "Production method and surface ownership of abandoned uranium mines (AUM) in relation to water wells: Ambrosia Lake uranium sub-district."
 3. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
 4. New Mexico Energy, Minerals, and Natural Resources Department, July 28, 2008. Shapefiles from contractor survey.
 5. New Mexico Environment Department, July 20, 2008. "Residential well questionnaire" (b) (6).
 6. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
 7. New Mexico Energy, Minerals, and Natural Resources Department, February 3, 2010. "Updates_AUM_table_NW_Ambrosia_Lake 02032010.xls."



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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS screening assessment of Bucky mine (Grants
Mining District), McKinley County, New Mexico: further action
under CERCLA recommended

Site name Bucky mine
Alternative names Section 14, Jeep No. 1-6, Buckey, Buckly, Bucky No. 1
Street address not applicable **City** not applicable **State** New Mexico
Zip code not applicable **County** McKinley
Latitude 35.441 **Longitude** -107.859 **TRS** T14N, R10W, s. 14SE

Site physical description:

The Bucky minesite ("Site") currently comprises a soil-covered area which marks the location of the 6 ft by 4 ft mine shaft (see P1), another smaller open shaft that is outfitted with an air supply pipe and hose from an earlier operational period (see P2), numerous piles of presumed waste materials, and scattered debris (see P3).

Site identification:

The site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

Through 1970, the mine produced 161,625 tons of ore from the Westwater Canyon member of the Morrison Formation, from which 770,893 pound of uranium oxide at an average grade of 0.24%, and 241 pounds of vanadium oxide, were recovered (Ref. 1, p. 2, 4). The actual

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Bucky mine (Grants Mining District), McKinley County, New Mexico
August 16, 2010

amount of additional production through 1991 is documented to be between 200,000 and 2 million pounds of uranium oxide (Ref. 1, p. 3, 4); additional ore reserves may still exist (Ref. 1, p. 4, 5). The depth of the ore is estimated to be 350 to 400 feet (Ref. 1, p. 5), which was above the water table (Ref. 2).

Site reclamation actions that were completed in November 2007 include covering of the mine shaft with an overturned ore bin set 15 ft below grade and above an 8 ft square by 2-ft thick concrete cap; the ore bin was then covered by rubble topped with soil to grade (Ref. 3). Additionally a remaining building, hoist, cable, and other miscellaneous materials were removed as part of these activities (Ref. 4). The minesite is currently involved in permitting for the Mining Act Reclamation Program (Ref. 5). Neutron Energy, Inc. currently is in negotiation to obtain surface rights from Southwest Resources, Inc. Mr. (b) (6) has staked mineral claims in the area that include the Site (Ref. 6).

Targets:

The Site is located approximately 600 ft west of ephemeral Martin Draw, which is a tributary of Arroyo del Puerto.

Well records from the New Mexico Office of the State Engineer that are located within a four-mile radius of the Site are shown in the table following (Ref. 7).

Site ownership and Potential Responsible Parties:

The mine was operated by Holly Minerals from 1957 until 1958. The See-Tee Mining Company operated between 1958 and 1965. The mine was operated by Hydro-Nuclear in 1972. From 1978 through 1980, and in 1982, Cobb Resources controlled the Site (Ref. 1, p. 2, 3; Ref. 8). Currently the surface is privately owned (Ref. 9); the U.S. Bureau of Land Management controls the mineral estate (Ref. 10).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

Personnel from the New Mexico Environment Department and New Mexico Energy, Minerals and Natural Resources Department visited the Site in the company of Mr. George Lotspeich (president of Southwest Resources, Inc.) and personnel from Neutron Energy, Inc. on July 29, 2010. All gamma readings shown on the figure accompanying this report were made with a Ludlum 14-C analog scintillometer (serial number 194209) with an uncollimated Ludlum 44-2 gamma detector (serial number PR241278), for which readings are recorded in counts per minute ("cpm"). Contact readings from this instrument at this Site ranged from 1800 cpm to 9000 cpm.

Ms. LaDonna Turner, EPA SAM

Pre-CERCLIS screening assessment of the Bucky mine, Grants Mining District, McKinley County, New Mexico

August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0.5 – 1.0	B 00372	SABRE-PINON CORPORATION	MIN	09/12/1956	796	0	8.63	75.0
1.0 – 2.0	B 00362	RIO ALGOM MINING LLC	MIN	11/30/1956	3093	0	10.75	475.0
	B 00363	RIO ALGOM MINING LLC	MIN	04/30/1956	745	0	4.5	20.0
	B 00366	RIO ALGOM MINING LLC	MIN	12/31/1955	760	0	4.5	10.0
	B 00371	SABRE-PINON CORPORATION	MIN	08/25/1956	752	0	8.63	100.0
	B 00373	RIO ALGOM MINING LLC	MIN	12/31/1956	1003	0	13.38	90.0
	B 00994	RIO ALGOM MINING LLC	MIN	09/18/1958	857	0		
	B 00994	RIO ALGOM MINING LLC	MIN	01/02/1958	827	0		
2.0 – 3.0	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0		
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0	5.0	0.0
3.0 – 4.0	B 00143	(b) (6)	DOM	07/18/1960	90	60		
	B 01246		STK	04/29/1992	1200	700	6.63	100.0
	B 01558		STK	03/19/2004	800	660	5.0	10.0

MIN -- MINING OR MILLING OR OIL

MON -- MONITORING WELL

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD

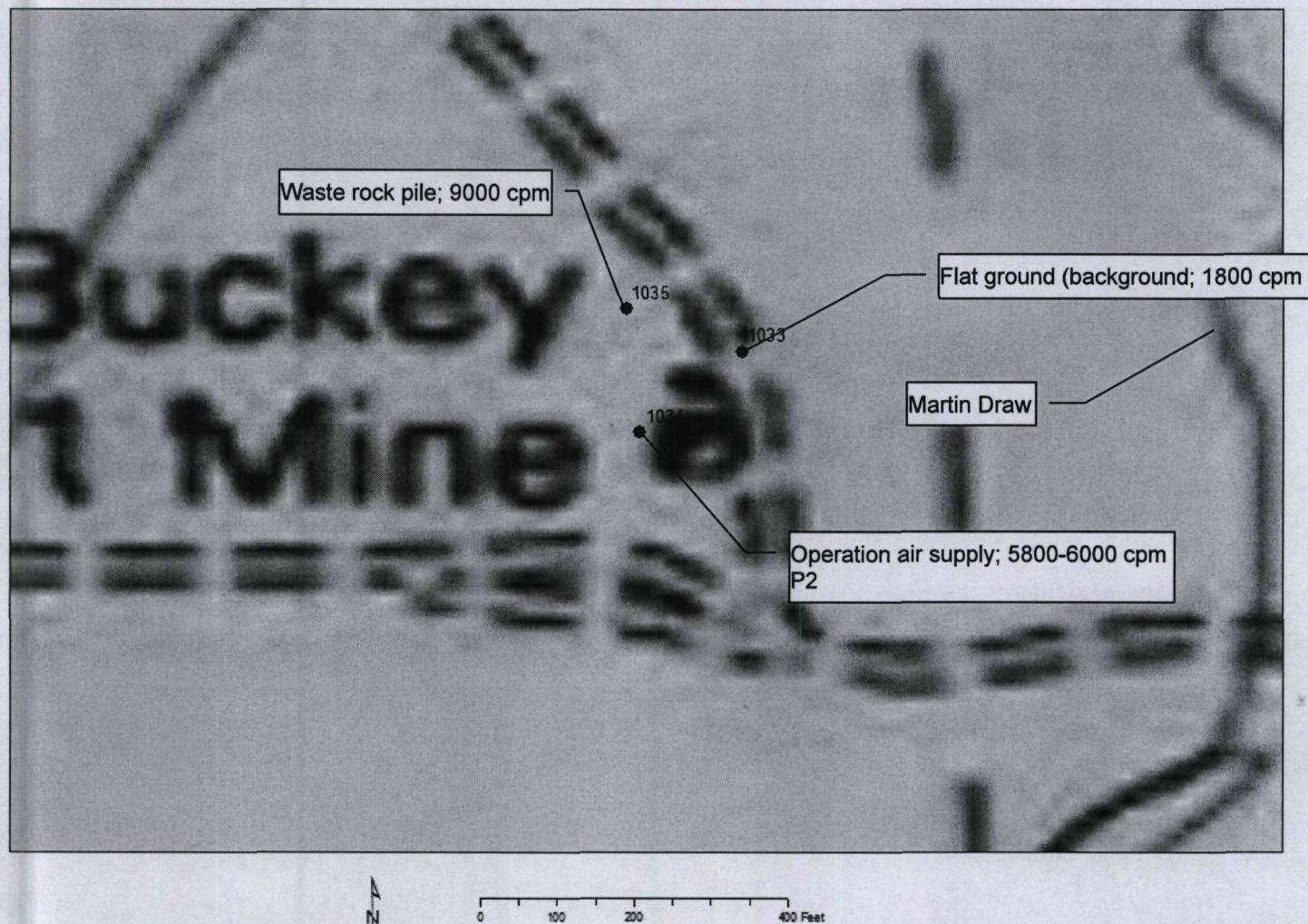
STK --72-12-1 LIVESTOCK WATERING

Recommendation:

Site reconnaissance and characterization under CERCLA is recommended to determine the existence and extent of radiological readings in excess of Site background to assess threats to human health and the environment. Additionally, the Site reconnaissance should assess any physical features, such as the remaining shafts, debris, or exploration drillholes, which may pose safety hazards to human trespassers or livestock. Investigation of sediments in surface water drainages originating or crossing this Site, as well as in Martin Draw, also is recommended to assess the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "dry" mines such as this Site initially would impact the alluvial ground water system through leaching of on-site waste materials and ore stockpiles. Such impacts, if they exist, predominantly may be localized to alluvial ground water in the vicinity of the Site. Alternatively ground water impacts may be more widespread, contributing to the overall potential degradation of the alluvial ground water regionally, as well as potentially to impacts to ground water in underlying bedrock aquifers. A generalized investigation of "dry" former uranium mines within the Grants Mining District is recommended as part of the characterization of ground water quality in the Grants Mining District.

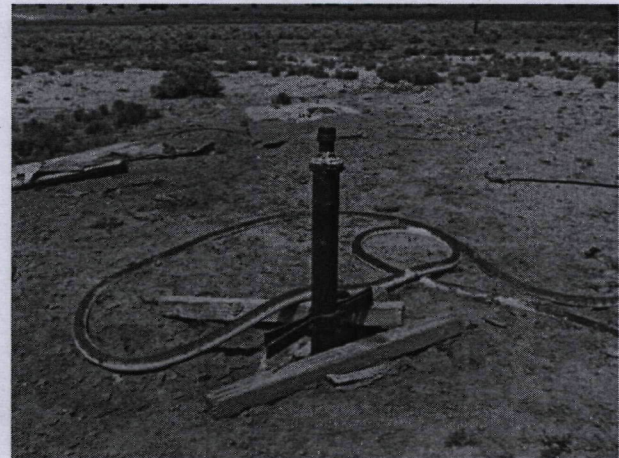
August 16, 2010



Observation from 07/29/2010 Site reconnaissance of Bucky minesite



P1: Site of Bucky mine shaft



P2: Air supply shaft and line



P3: Waste materials on Bucky minesite

August 16, 2010

1. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
2. New Mexico Energy, Minerals, and Natural Resources Department, January 2009. "Production method and surface ownership of abandoned uranium mines (AUM) in relation to water wells: Ambrosia Lake sub-district." Map.
3. Domenici, Pete V. Jr., December 20, 2007. "RE: Director's order: Section 14 mine, File No. MK019PR; Reclamation Report." Letter to Mr. Holland Shepard, New Mexico Energy, Minerals, and Natural Resources Department.
4. Domenici, Pete V. Jr., February 1, 2008. "Re: Section 14 shaft closure." Letter to Mr. Chris Eustice, New Mexico Energy, Minerals, and Natural Resources Department.
5. Pfeil, John (New Mexico Energy, Minerals, and Natural Resources Department), July 20, 2010. "RE: Request for update." Email to David L. Mayerson (New Mexico Environment Department).
6. U.S. Bureau of Land Management, accessed July 20, 2010. Geocommunicator (accessed by <http://www.geocommunicator.gov/GeoComm/index.shtm>).
7. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
8. LucasKamat, Susan (New Mexico Energy, Minerals, and Natural Resources Department), June 11, 2010. "RE: Request for information." Email to David L. Mayerson (New Mexico Environment Department).
9. New Mexico Environment Department, July 20, 2010. Grants U belt project notebook.
10. Lucas-Kamat, Susan (New Mexico Energy, Minerals, and Natural Resources Department), July 20, 2010. "RE: Request to accompany MMD on mine reconnaissance." Email to David L. Mayerson (New Mexico Environment Department).



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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of the John Bull Mine,
New Mexico: Further action under CERCLA recommended

Site name	John Bully mine	Alternative names	John Bill, John Bull, John Bully shaft
Street address	not applicable	City	not applicable
Zip code	not applicable	State	New Mexico
		County	McKinley
Latitude	35.400139	Longitude	-107.780463
		TRS	14N, 9W, s. 34

Site physical description:

In 2007, the John Bully minesite ("Site") comprised an approximately 4-acre reclaimed area. The mineshaft was initially reclaimed and seeded in 1994. The only remaining visible feature then was an abandoned wooden-framed electrical substation structure (Ref. 1).

Site identification:

The site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

The Site was operated between 1959 and 1963 by Phillips Petroleum, and from 1963 until 1980 by United Nuclear Corporation ("UNC;" Ref. 2). Mining operations necessitated dewatering of the ore body; uranium was extracted from the mine water effluent during the operation (Ref. 3).

Targets:

The Site is located within 600 ft of the Voght Tank and 300 ft of a ditch shown on the

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the John Bully mine (Grants Mining District), McKinley County,
New Mexico
August 16, 2010

topographic map; the Voght Tank is documented to have received effluent from mining operations, and drains into the Arroyo del Puerto ("AdP").

Well records from the New Mexico Office of the State Engineer that are located within a four-mile radius of the Site are shown in the table following (Ref. 4).

Site ownership and Potential Responsible Parties:

Surface rights are owned by UNC. Hecla Mining Company owns the mineral rights (Ref. 5).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

The most recent site reconnaissance occurred in 2007.

Recommendation:

The New Mexico Environment Department has found little specific documentation about the Site. A current Site reconnaissance is recommended. A radiological survey of surface drainages and erosional features crossing or originating from the Site is recommended to assess possible impacts to sediments.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water was pumped from the John Bully mine in order to access the ore deposits and probably was discharged into the nearby ditch, which empties to the Voght Tank and eventually to the AdP drainage. This ditch near the Site and the Voght Tank should be surveyed to attempt to determine where the effluent discharge may have been routed; radiological surveying and sediment sampling to depth also is recommended to determine potential impacts to sediments. Impacts from the Site may be difficult to discriminate from impacts originating from other legacy uranium sites that utilized the same drainage system. A generalized investigation of potential alluvial ground water impacts from "wet" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-Site installation of one or more monitor wells then should be considered.

Data from other former "wet" mines suggest that repressurization of the ore-host rock, following cessation of pumping for mine dewatering, may be causing mobilization of uranium and associated minerals, and consequent degradation of ground water quality, due to influx of oxygenated ground water. The potential for such impacts, on both regional and site-specific scales, should also be assessed and characterized.

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the John Bully mine (Grants Mining District), McKinley County, New Mexico
 August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
2.0 – 3.0	B 01190	(b) (6)	STK	08/31/1989	390	37		15.0
3.0 – 4.0	B 00456	(b) (6)	STK		0	0		
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0		
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0	5.0	0.0
	B 01104	(b) (6)	DOM	04/02/1986	303	247	4.0	12.0
	B 01115		DOM	07/21/1986	478	204	4.0	30.0
	B 01544		DOM	06/14/2003	715	624	5.0	6.0
	B 01636		DOM	05/10/2005	260	80	4.0	5.0

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD

MON -- MONITORING WELL

STK -- 72-12-1 LIVESTOCK WATERING

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the John Bully mine (Grants Mining District), McKinley County,
New Mexico

August 16, 2010

-
1. New Mexico Energy, Mineral, and Natural Resources Department, November 15, 2007. "Mining inspection report, Anne-Lee and John-Bill mines."
 2. New Mexico Energy, Mineral, and Natural Resources Department. 2007-07-20_to_NMED-GWQ-Sfund.xls.
 3. New Mexico Energy, Mineral, and Natural Resources Department. AUM_AOI_10Mar09.xls.
 4. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
 5. New Mexico Energy, Mineral, and Natural Resources Department. 20100603_LUMs_Assessment_List_EPA_NMED.xls.



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RON CURRY
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SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of the Section 32 mine
(Grants Mining District), McKinley County, New Mexico: further
action under CERCLA recommended

Site name	Section 32 mine	Alternative names	UP+HP, Section 29, Section 31
Street address	not applicable	City	not applicable
Zip code	not applicable	State	New Mexico
Latitude	35.403	County	McKinley
Longitude	-107.815	TRS	T14N, R9W, s. 32

Site physical description:

The Section 32 mine ("Site") is located approximately 5 miles southeast of the junction of State highways 509 and 605. In a 1980 inspection, a headframe was still present at the Site, and the mine was considered to be inactive, and not abandoned (Ref. 1, p. 16-17). A 1995 inspection report (Ref. 2, p. 12) indicates that the minesite comprised a 60 acre area where the mine headframe had existed, with all other remaining mine workings underground. Based in part upon this report, the New Mexico Energy, Minerals and Natural Resources Department released Homestake Mining Company from further requirements of the New Mexico Mining Act (Ref. 2). Previously, the New Mexico Land Commission officially terminated Homestake Mining Company's lease pending this approval (Ref. 2, p. 12).

Site identification:

The Site is one of numerous legacy uranium sites within the Grants Mining District.

Site summary:

A vertical shaft for the mine was completed in 1958 to a depth of 651 feet in order to access a multi-layered uranium deposit below the water table within the Westwater Canyon member of the Morrison Formation. The ore had low lime and vanadium contents (Ref. 1, p. 16), and averaged 0.20% uranium oxide (Ref. 3, p. 3). At least some production came from ore underlying sections 29 and 31; Ref. 3 indicates that these deposits may

Ms. LaDonna Turner, EPA R6 SAM

RE: Pre-CERCLIS screening assessment of the Section 32 mine (Grants Mining District), McKinley County, New Mexico.

August 16, 2010

have mined by Kermac Nuclear and Kerr-McGee (Ref. 3, p. 2-4). However, New Mexico Energy, Minerals and Natural Resources Department Mining Act Reclamation Program Prior Reclamation records indicate that the Section 32 mine always was operated by Homestake and various partnerships in which it was participant (Ref. 4). Through 1970, the Section 32 mine had produced over 1.9 millions pounds of uranium oxide from over 488 thousands tons of ore (Ref. 3, p. 3). Water from the mine was pumped into ponds. There were no surface water features in the section; surface drainage was to an unnamed tributary of the Arroyo del Puerto. Structures that existed during the operational period included an access road, vertical shaft, ventilation borehole, hoist house, office and change room building, and a dewatering pond or ponds (Ref. 2, p. 12).

Reclamation was conducted by an independent contractor in August 1991, and the Site was afterwards grazed as required under the lease agreement with the State of New Mexico (Ref. 2, p. 12). Reclamation proceeded in 3 phases, and included removal of buildings, hoist, and headframe; sealing of the vertical shaft and borehole; and trash removal. The boreholes were backfilled to within 5 feet of the surface, with casings cut-off at 4 to 8 feet below the original ground surface. All but one borehole was topped with a 2-foot thick, reinforced concrete cap; one borehole had a steel plate welded to the top of the casing. The vertical shaft was backfilled to within 2 feet of the surface and capped with a reinforced concrete cap. The ponds were filled with material from containment berms, and the surface was graded to create a smooth surface. Waste piles were reshaped, covered with top soil, and contoured for natural drainage (Ref. 5, p. 32-3 to 32-4). An area labeled "runoff collection ponds" located to the west of state highway 509 and southwest of the Section 32 minesite (Ref. 6, Figure 1) also was reclaimed during these activities (Ref. 5, Figure 8). Finally 60 acres were reseeded using a drill seeder and mulch (Ref. 5, p. 32-4).

Homestake Mining Company included this minesite in its nomination for 1997 "Excellence in reclamation" awards (Ref. 7).

Targets:

The Site is indicated to be located within 200 feet of a ditch, and within a mile of the Arroyo del Puerto.

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 8).

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the Section 32 mine (Grants Mining District), McKinley County, New Mexico.
 August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
1.0 – 2.0	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0		
	B 00522	UNITED NUCLEAR-HOMESTAKE PTNRS	MON	02/07/1978	70	0	5.0	0.0
2.0 – 3.0	B 00366	RIO ALGOM MINING LLC	MIN	12/31/1955	760	0	4.5	10.0
	B 00371	SABRE-PINON CORPORATION	MIN	08/25/1956	752	0	8.63	100.0
	B 00994	RIO ALGOM MINING LLC	MIN	09/18/1958	857	0		
3.0 – 4.0	B 00363	RIO ALGOM MINING LLC	MIN	04/30/1956	745	0	4.5	20.0
	B 00372	SABRE-PINON CORPORATION	MIN	09/12/1956	796	0	8.63	75.0
	B 01190	(b) (6)	STK	08/31/1989	390	37		15.0

MIN -- MINING OR MILLING OR OIL
 MON -- MONITORING WELL
 STK --72-12-1 LIVESTOCK WATERING

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Section 32 mine (Grants Mining District), McKinley County,
New Mexico.
August 16, 2010

Site ownership and Potential Responsible Parties:

Homestake-New Mexico operated the mine between 1958 and 1961 (Ref. 3, p. 3). Between 1961 and 1968, operations were conducted by the Homestake-Sapin Partners. United Nuclear-Homestake Partnership operated between 1968 and 1981. Homestake Mining Company-Grants, which was later renamed Homestake Mining Company-California, became operator of the mine from 1981 until 1982 (Ref. 2, p. 12; Ref. 3, p. 3-4). In total, the mine operated between 1958 and 1979. The surface and mineral estate is owned by the State of New Mexico (Ref. 2, p. 12).

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

The last documented Site reconnaissance occurred in 1995 (Ref. 2).

Recommendation:

The Site should be assessed for surface and radioactivity hazards to determine if surface reclamation has been effective in the long-term elimination of such threats to human health and the environment. Additionally, the capping of shafts and boreholes should be evaluated to determine their long-term effectiveness toward preventing potential contaminant migration to ground water. NMED also recommends assessment of sediments in the Site vicinity in order to evaluate the potential occurrence of impacts from dispersal of waste materials that have been left on-Site.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water was pumped from the Section 32 mine in order to access the ore deposits, but the final disposition of the discharged effluent is not known. A generalized investigation of potential alluvial ground water impacts from "wet" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. If this generalized investigation were to indicate a potential for alluvial ground water impacts, on-Site installation of one or more monitor wells then should be considered.

Data from other former "wet" mines suggest that repressurization of the ore-host Morrison Formation, following cessation of pumping for mine dewatering, may be causing mobilization of uranium and associated minerals, and consequent degradation of ground water quality, due to influx of oxygenated ground water. The potential for such impacts, on both regional and site-specific scales, should also be assessed and characterized.

1. Anderson, Orin J., 1980(?). "Abandoned or inactive uranium mines in New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 148.
2. New Mexico Energy, Minerals and Natural Resources Department, September 29, 1995. "RE: Prior reclamation release, Section 13, 14, 23, 25, and 32 mines, McKinley County, New Mexico." Letter from Kathleen A. Garland, Director (NMEMNRD/MMD) to Fred Craft, Resident Director, Homestake Mining Company of California). Includes the report: "Homestake Mining Company—California, September 26, 1995. Prior reclamation inspection report and recommendation for release or permit requirement."
3. McLemore, Virginia T. and William L. Chenoweth, revised December 1991. "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico." New Mexico Bureau of Mines and Mineral Resources Open-file report 353.
4. New Mexico Energy, Minerals and Natural Resources Department, August 16, 2010. "RE: section 32 mine-MARP Prior Rec files." Emailed edits from Susan Lucas-Kamat (NMEMNRD) to David L. Mayerson (NMED).
5. Homestake Mining Company of California, August 29, 1994. "Reclamation report, Section 32 mine."

Ms. LaDonna Turner, EPA R6 SAM

RE: Pre-CERCLIS screening assessment of the Section 32 mine (Grants Mining District), McKinley County, New Mexico.

August 16, 2010

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6. New Mexico Energy, Minerals and Natural Resources Department, August 15, 1995. "Prior reclamation inspection report and recommendation for release or permit requirement, Homestake Mining Company of California—Section 32 mine."
 7. Homestake Mining Company of California, July 25, 1997. "Re: Nomination for Excellence in Reclamation awards in 2 categories: Category: Existing Mine Reclamation – 4 sites are nominated; Category: Voluntary Reclamation – Part of 1 mill site is nominated."
 8. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.



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RON CURRY
Secretary
SARAH COTTRELL
Deputy Secretary

Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of the Johnny M mine
(Grants Mining District), McKinley County, New Mexico:
Further action under CERCLA recommended

Site name	Johnny M mine	Alternative names	not applicable
Street address	not applicable	City	not applicable
Zip code	not applicable	State	New Mexico
Latitude	35.361959	County	McKinley
Longitude	-107.721956	TRS	T13N, R8W, s. 7 and eastern half of s. 18

Site physical description:

Features currently at the Johnny M minesite ("Site"), as documented during New Mexico Environment Department's ("NMED's") inspection on July 26, 2010, include a metal half-cylindrical overhang (see P1, P2 and P10), at the back of which is a partially-collapsed elevated wooden platform and a locked vault door (see P15). According to the property owner, (b) (6), the vault now safeguards artifacts that have been collected from the Floyd Lee Ranch. Additionally, the Site includes several concrete pads (see P8, P11 and P16), several subterranean cylindrical metal vaults and vertical pipes—most of which contain pipes (see P14) and some of which are only partially covered with metal plates (see P4 and P5)—and a fenced former substation with 5 presumed former transformer pads (see P7). The Site is located within a steep-sided valley (see P10 and P12) that broadens considerably toward its mouth, opening into the broader valley of San Mateo Creek ("SMC;" see P13). A predominantly straight drainage, in which concrete debris (see P8), pipes, and wires are exposed, trends southeastward in the direction of SMC; this may be the former dewatering ditch/pipe that is discussed below. The floor of the valley is mostly very flat and appears to

have been graded. Two of the concrete pads include large diameter circular features, one of which has a protruding open pipe (see P11); these circular features may be the locations of the former mine shafts, and the protruding pipe may be the location of a ground water monitoring access point that is referenced in NMED documents from the time of Site reclamation. There are abundant pieces of thin wire exposed in the soil around the Site, and one blasting cap was identified by a member of the State inspection team. Additionally there are small amounts of iron and wood debris scattered around the Site (see P6).

The Site is accessed from state highway 605 through the Floyd Lee Ranch via unpaved roads. State personnel did not attempt to drive all the way to the mine site, although this appears to be possible with 4-wheel drive. Another old road leading from the mouth of the valley toward state road 605 now ends at a locked gate at the Floyd Lee Ranch property boundary.

Site identification:

The Site is one of numerous former uranium mines within the Grants Mining District.

Site summary:

Ore in this mine came from the Poison Canyon tongue of the Brushy Basin member, which overlies the main Westwater Canyon member of the Morrison Formation by approximately 25 feet ("ft"), and also from a zone near the top of the Westwater Canyon member. The depth of the ore-bearing horizons was between 1300 and 1400 ft below ground surface (Ref. 1, p. 1). The ore-bearing zone originally was saturated, but did not resaturate once drained, despite being below the water table (Ref. 3, p. 2). Analysis of ground water chemical data indicates that leakage from the overlying Dakota Formation into the Westwater Canyon has occurred at this mine, which is attributed to ore-body dewatering, despite separation of the two formations by a thick shale sequence (Ref. 2). Discharge plan application DP-20 references current discharge of approximately 1 millions gallons per day ("gpd") to two settling ponds and thence to SMC via a one-mile open ditch across Section 18 that was to be replaced by a 12-inch pipe (Ref. 3, p. 3). Each of the ponds was approximately 100 ft by 400 ft by 15 ft deep, and was constructed subgrade between the base of the Gallup formation and the top of the Mancos Shale. The discharge plan was submitted to the New Mexico Environmental Improvement Board prior to March 27, 1978 (Ref. 3, p. 1), and approved on June 16, 1978 for a five-year period by the New Mexico Environmental Improvement Division ("NMEID") Water Pollution Control Section (Ref. 4). Operations also were conducted under Radioactive Materials License NM-RED-MB-00 (Ref. 5). A map accompanying the discharge plan indicates that the pipe was to lead to an arroyo which then flowed to SMC in Section 19 (Ref. 3, p. x). The area to which discharge occurred was covered by 50 to 80 ft of alluvium and underlain by Mancos shale (Ref. 3, p. 3). Extracted ground water was treated prior to discharge to the ponds by the addition of Nalco 8114 coagulant and a solution of 25% BaCl₂ by weight (Ref. 6). Subsurface monitoring of the discharge routing above the Mancos Shale was provided by two monitor wells—GW-7 and GW-8; two other monitoring points—MW-1 and MW-2—also provided monitoring of the surface discharge. A total of eight monitoring locations are referenced for the Site in the application (Ref. 3, p. 4).

The mine shaft was sealed with a four-foot thick water ring reinforced concrete plug set between the Dakota and Westwater members, and installation of a 12-inch thick reinforced

concrete plug with a 20-inch diameter capped steel pipe into the portal (Ref. 7 p. 1-2). Additional proposed reclamation activities included debris burial, partial filling of ponds with waste rock and completion with borrow materials, reconstruction of water diversion into the "old arroyo," and undercutting of waste pile toe.

Backfilling of mine stopes with tailings from the Kerr-McGee mill (now the Ambrosia Lake/Rio Algom mill), where the ore from the mine was processed, was begun in 1977 (Ref. 8, p. 56). Two one-acre areas were utilized at each of 2 surface injection locations for temporary storage of the uranium tailings. An estimated total of 286,000 tons of tailings were slurried into the mine at a depth of approximately 1100 to 1300 ft (Ref. 7, p. 1).

Ranchers Exploration and Development filed notice of its intent to cease mining at the Johnny M mine by mid-February, 1982 (Ref. 9), and site reclamation was underway during a site visit later that year (Ref. 10). NMEID sent a letter to Hecla Mining Company on April, 2, 1985 (Ref. 11), which extended the force of Radioactive Materials License NM-RED-MB-15 through amendment, due to persistent elevated exposure levels at both the North and South vent hole area backfill sites.

Ranchers constructed a monitor well into the Westwater Canyon ore horizon through the north vent hole shaft in order to monitor potential water quality impacts from backfilled tailings during resaturation following mining cessation (Ref. 12). A ground water sample collected from the mine on June 19, 1985 indicated that only manganese exceeded then-current NMWQCC standards (Ref. 13). The Nuclear Regulatory Commission ("NRC") sent notice to Hecla Mining Company in 1993 of the termination of source material license SUA-1482 for the Johnny M Mine (Ref. 14).

Approximately 2 million pounds of uranium oxide (U_3O_8) were produced from the mine, and approximately 1.5 million pounds are estimated to remain (Ref. 1, p. 1).

Targets:

Potential impacts to the alluvial ground water system during site operation may have occurred from ground water discharges from mine workings to settling ponds and the SMC drainage. Some portion of discharged contaminants may adhere to sediments, and propagate episodically downgradient in response to streamflows within the SMC drainage. Current details of alluvial ground water flow are unknown, but are thought to follow general topographic slope (i.e., locally southward from the Site, and generally westward in the direction of surface water flow). Such alluvial ground water impacts may also propagate into underlying bedrock aquifers through stratigraphic, structural, and/or anthropogenic (e.g., leaky wells, mine shafts) interconnections. Additional contaminant mobilization in ore-bearing Westwater Canyon Formation could result from oxygenated ground water influx resulting from progressive basin recharge following cessation of mining activities. Site-originated impacts also may have occurred from wastes remaining on-site.

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 15).

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County, New Mexico
 August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0 – 0.25	B 00390	FERNANDEZ CO. LTD	IRR	12/31/1974	1800	900	6.63	850.0
0.25 – 0.50	B 01544	(b) (6)	DOM	06/14/2003	715	624	5.0	6.0
0.50 – 1.0	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN	05/14/1981	1611	1315	4.5	
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00851	KERR-MCGEE NUCLEAR CORP.	DEW		0	0		
1.0 – 2.0	B 01084	FERNANDEZ COMPANY	STK	01/01/1963	320	60		
2.0 – 3.0	B 00456	(b) (6)	STK		0	0		
	B 00557	NEW MEXICO STATE HWY DEPT	PUB		0	0		
	B 00997	(b) (6)	MUL		0	0		
	B 01104		DOM	04/02/1986	303	247	4.0	12.0
	B 01190		STK	08/31/1989	390	37		15.0
3.0 – 4.0	SD 00966	(b) (6)	IRR		0	0		
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	20.0
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/10/1977	95	72	5.0	2.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/11/1977	90	73	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/12/1977	80	74	5.0	1.0
	B 00544	(b) (6)	SAN	06/17/1978	68	30	6.63	8.0
	B 00659		DOM	01/18/1979	220	190		15.0
	B 00861		DOM		0	0		
	B 01085	FERNANDEZ COMPANY LTD.	IRR		0	0		
	B 01086	FERNANDEZ COMPANY	STK	01/01/1947	210	20		
	B 01115	(b) (6)	DOM	07/21/1986	478	204	4.0	30.0
	B 01442	FERNANDEZ COMPANY, LTD.	EXP	06/15/2000	620	87	12.75	1010.0
	B 01442	FERNANDEZ COMPANY, LTD.	EXP	05/28/2002	1150	107	8.63	340.0

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County, New Mexico

August 16, 2010

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
	B 01636	(b) (6)	DOM	05/10/2005	260	80	4.0	5.0
	RG 43456	FERNANDEZ COMPANY	STK	01/01/1935	300	0		
	RG 43457	FERNANDEZ COMPANY	DOM	01/01/1967	320	50		

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD

DEW -- DEWATERING WELL

EXP -- EXPLORATION

IRR -- IRRIGATION

MIN -- MINING OR MILLING OR OIL

MON -- MONITORING WELL

MUL -- 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS

PUB -- 72-12-1 CONSTRUCTION OF PUBLIC WORKS

STK -- 72-12-1 LIVESTOCK WATERING

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County,
New Mexico
August 16, 2010

Site ownership and Potential Responsible Parties

After discovery of the ore body in 1968, Harrison Western Corporation sunk a shaft between 1972 and 1973. The mine was operated by Kop-Ran Development Corporation and Ranchers Exploration and Development between 1976 through 1982. Hecla Mining Company was the successor to Rancher's interests in the Site prior to April 2, 1985 (Ref. 16). The last recorded Site operator was Newmont Mining Company.

The mineral rights were held by the Santa Fe Railroad in 1982 (Ref. 17). Subsequently Newmont Mining Company acquired these mineral rights when sold by Santa Fe Railroad (Ref. 18). The surface is currently owned by Fernandez Company Limited and Floyd Lee Ranch. According to Mr. Lee, new mining claims have been staked on the Site in recent years.

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

Personnel from NMED and the New Mexico Energy, Minerals, and Natural Resources Department conducted a Site reconnaissance on July 26, 2010; Mr. (b) (6) accompanied state personnel to the head of valley in which the Site is located. All gamma readings shown on the figure accompanying this report were made with a Ludlum 14-C analog scintillometer (serial number 194209) with an uncollimated Ludlum 44-2 gamma detector (serial number PR241278), for which readings are recorded in counts per minute ("cpm"). Contact readings from this instrument ranged from 2800 cpm on the access road at the head of the valley above the minesite, to 260,000 cpm on the graded area near the mouth of valley. The ground surface at the Site was very wet from heavy rainfall that had occurred during days prior to the Site reconnaissance, and additional rain occurred sporadically throughout the Site visit. According to a representative from Ludlum, such environmental conditions could cause readings from the instrument to be higher than would otherwise occur under dry conditions. Additional elevation of readings also may occur due to radioactivity "shine" caused by topographic conditions or nearby radioactive sources. As further evidence of these potential effects upon the data herein reported, a grab sample of soil from Geographic Positioning Station ("GPS") 14, shown on the accompanying figure, was collected in a ziplock bag, allowed to desiccate for a day, and then another scintillometer reading was taken of the sample. The reading in the field at the location of this sample was 120,000 cpm; the reading from the sample was 12,000 cpm.

During the Site reconnaissance, State personnel also viewed the location of a nearby incomplete mine shaft that originally had been sunk by the Kerr-McGee Corporation on the Floyd Lee Ranch; this shaft has been converted into a water well.

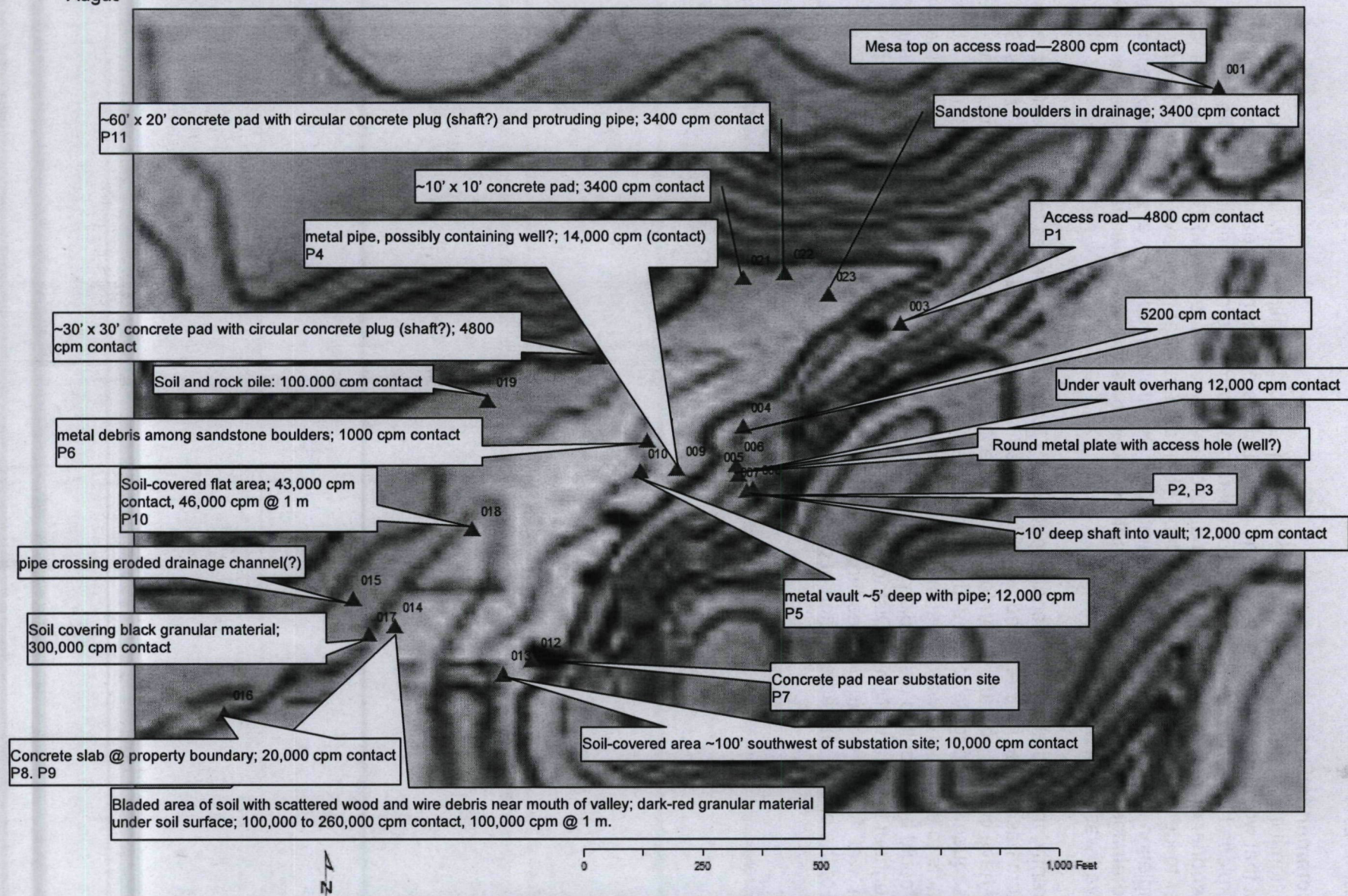
According to Mr. Lee, all possible accesses to ground water in the vicinity of the Site and including those on the Site have been sampled recently by Strathmore Minerals Corporation as part of its baseline data collection for the proposed Roca Honda mine.

Ms. LaDonna Turner
Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County,
New Mexico
August 16, 2010

Recommendation:

Additional investigation of the Site is recommended to determine if any impacts or conditions exist that would pose threats to human health and the environment, especially the presence of unexploded blasting caps. NMED recommends performance of a radiological Site survey under drier environmental conditions than prevailed at the time of NMED's reconnaissance in order to identify any areas of unacceptably high radiation that may have developed since completion of earlier Site surface reclamation. The area of radiological survey should include the drainage or ditch leading from the Site in order to assess the potential for dispersal of Site-derived waste materials.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "wet" mines such as this Site may have caused contamination to both sediments and the surface water system, which subsequently propagate to the alluvial and underlying bedrock ground water systems. Such impacts to the ground water system may both occur and propagate over widespread areas, and could be difficult to distinguish from impacts from numerous other legacy uranium sites throughout the Grants Mining District. A generalized investigation of ground water impacts from "wet" former uranium mines throughout the Grants Mining District is recommended as part of the overall characterization of ground water quality in the Grants Mining District.



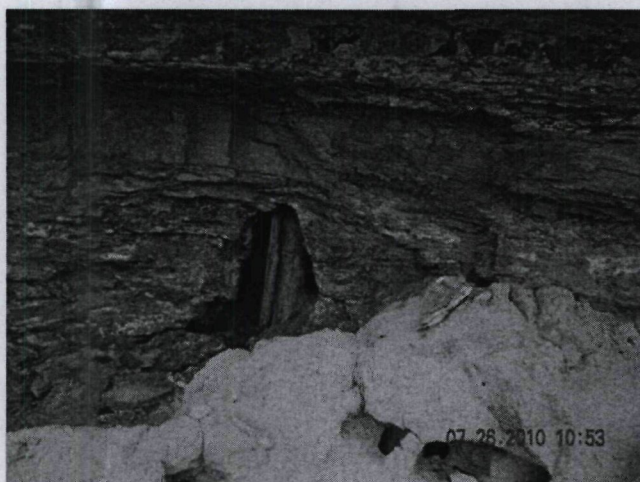
Observations from 07/26/2010 Site reconnaissance of Johnny M minesite



P1: View of vault to southwest from access road



P2: View to west side of valley from above vault overhang



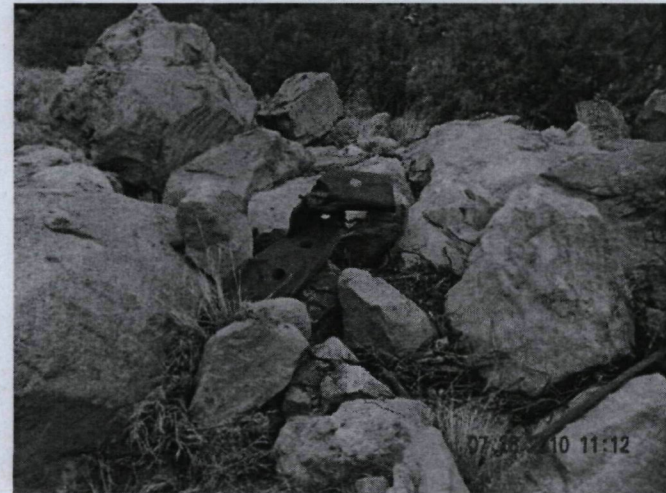
P3: View to east of utilities entering vault below through escarpment



P4: Metal pipe, possibly containing well



P5: ~5-ft deep vault with piping



P6: Metal debris among sandstone boulders



P7: Former substation location with 5 transformer pads



P8: View to south of concrete slab along drainage



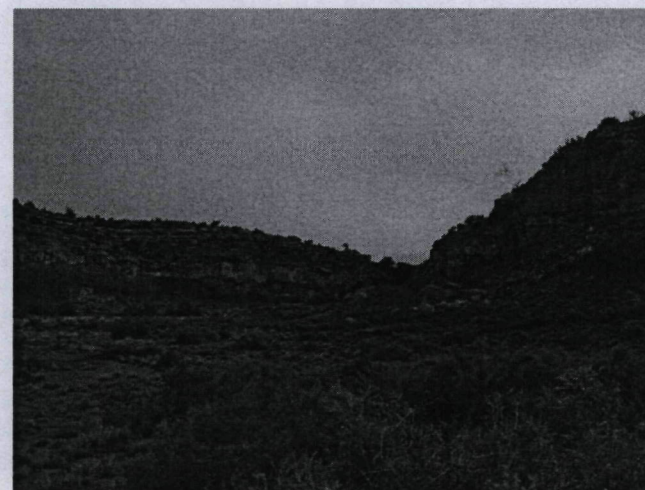
P9: View to north along drainage towards head of valley and minesite



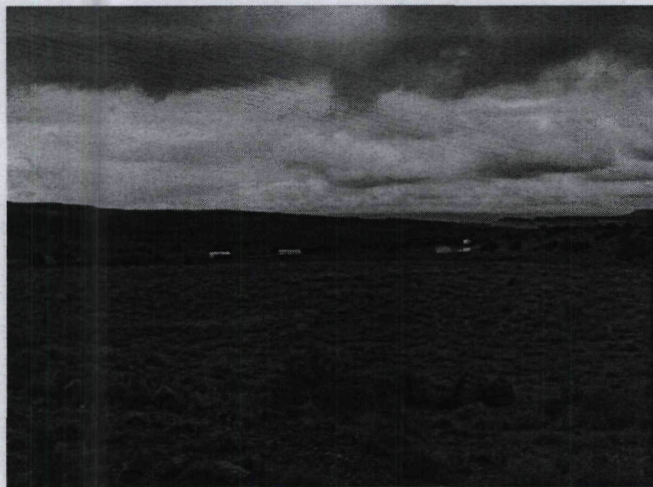
P10: View of vault entrance toward northeast



P11: Concrete pad with circular concrete plug and protruding pipe



P12: View north toward head of valley



P13: View south from mouth of valley toward San Mateo Creek



P14: View into a metal circular vault



P15: View into metal overhang showing platform and vault door



P16: View toward southeast of valley

Ms. LaDonna Turner

Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County,
New Mexico

August 16, 2010

1. McLemore, Virginia T. and William L. Chenoweth, December 1991 (revised). "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico."
2. Kelly, T.E.; Link, Regina; and Schipper, Mark, 1980. "Effects of uranium mining on ground water in Ambrosia Lake area, New Mexico." New Mexico Bureau of Mines and Mineral Resources Memoir 38.
3. Discharge plan for the Johnny M Mine (undated).
4. State of New Mexico Environmental Improvement Division, June 16, 1978. Letter to Ranchers Exploration and Development Corporation).
5. State of New Mexico Environmental Improvement Agency, June 22, 1977. Letter to Ranchers Exploration and Development Corporation).
6. Ranchers Exploration and Development Corporation, undated. "E.I.A." [Environmental Impact Assessment]. Received by New Mexico Environmental Improvement Division on August 20, 1980.
7. Hall, Ramon E. (Director, Uranium recovery field office, Division of radiation safety and safeguards [NRC?], December 21, 1990. "Subject: Termination of the source material license issued to Hecla Mining Company for the Johnny M mine, San Mateo, New Mexico." Memorandum to William Brown (Regional Counsel, Region IV [NRC?]).
8. New Mexico Health and Environment Department, July 1980. "Water quality data for discharges from uranium mines and mills in New Mexico."
9. Ranchers Exploration and Development Corporation, January 14, 1982. Letter to New Mexico Environmental Improvement Division.
10. State of New Mexico Environmental Improvement Division, July 19, 1982. Memorandum to file.
11. Miera, Felix R. (NMEID Program Manager, Uranium licensing section), April 2, 1985. Letter to Ms. Colleen Kelley (Environmental Supervisor, Hecla Mining Company). Notice of indefinite extension of Radioactive Material License NM-RED-MB-15 for the Johnny M Mine.
12. Hicks, Randy, September 29, 1982. Letter to Ms. Iona Lee (Lee Ranch)
13. Sares, Steven, (NMED), October 2, 1985. Letter to Colleen D. Kelley (Environmental Supervisor, Hecla Mining Company).
14. Nuclear Regulatory Commission, May 24, 1993. Letter to Hecla Mining Company.
15. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
16. White, Michael B. (Counsel and Assistant Secretary, Hecla Mining Company), April 18, 1985. Letter to Felix R. Miera, Jr. (Program Manager, Uranium Licensing Section, New Mexico Environmental Improvement Division).
17. Rosel, James M. (Assistant Vice President and Assistant Secretary for Ranchers Exploration and Development Corporation), April 13, 1982. Letter to Randy Hicks (NMEID).
18. New Mexico Energy, Minerals and Natural Resources Department, August 16, 2010. "RE: section 32 mine-MARP Prior Rec files." Emailed edits from Susan Lucas-Kamat (NMEMNRD) to David L. Mayerson (NMED).